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=> file wpix
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=> d que l25
L3             1 SEA FILE=REGISTRY ABB=ON  POLYPROPYLENE/CN
L4             1 SEA FILE=REGISTRY ABB=ON  POLYETHYLENE/CN
L6        206786 SEA FILE=HCAPLUS ABB=ON  L3 OR PP OR POLYPROPYLENE
L7        383954 SEA FILE=HCAPLUS ABB=ON  L4 OR PE OR POLYETHYLENE
L8         66002 SEA FILE=HCAPLUS ABB=ON  L6 AND L7
L21         9212 SEA FILE=HCAPLUS ABB=ON  SEPARAT?(3A)(MULTILAYER? OR BILAYER?
                 OR TRILAYER? OR 2ND OR SECOND OR TRI(W)LAYER? OR MULTI(W)LAYER?
                  OR BI(W)LAYER? OR STACK?(3A)?LAYER?)
L22           94 SEA FILE=HCAPLUS ABB=ON  L21 AND L8
L23           53 SEA FILE=HCAPLUS ABB=ON  L22 AND BATTER?
L25           15 SEA FILE=WPIX ABB=ON  L23 AND FILM?


=> d l25 full 1-15

L25  ANSWER 1 OF 15  WPIX  COPYRIGHT 2006 THE THOMSON CORP on STN
AN   2005-144808 [16]    WPIX
DNN  N2005-123037        DNC C2005-047226
TI   Battery separator useful in e.g. lithium secondary
     batteries comprises multi-layered microporous film, with
     individual layers bonded together by heat and pressure.
DC   A32 A85 L03 X16
IN   CALL, R W
PA   (CELG-N) CELGARD INC; (CALL-I) CALL R W
CYC  38
PI   EP 1505671      A2 20050209 (200516)* EN    6    H01M002-16
        R: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IT LI LT LU
           LV MC MK NL PL PT RO SE SI SK TR
     US 2005031943   A1 20050210 (200516)             H01M002-18
     CA 2472281      A1 20050207 (200517)  EN         H01M002-14
     JP 2005056851   A  20050303 (200517)        9    H01M002-16
     CN 1581534      A  20050216 (200535)             H01M002-14
     KR 2005015998   A  20050221 (200542)             H01M002-14
ADT  EP 1505671 A2 EP 2004-18207 20040731; US 2005031943 A1 US 2003-636115
     20030807; CA 2472281 A1 CA 2004-2472281 20040625; JP 2005056851 A JP
     2004-231815 20040809; CN 1581534 A CN 2004-58886 20040803; KR 2005015998 A
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applicant

KR 2004-52636 20040707
PRAI US 2003-636115 20030807
IC ICM H01M002-14; H01M002-16; H01M002-18
ICS B29C047-00; B29D007-01; B29D009-00; B32B027-32
AB EP 1505671 A UPAB: 20050308
NOVELTY - A **battery separator** comprises **multi -layered** (e.g. tri-layered) microporous **film**, with individual layers bonded together by heat and pressure and having a peel strength of greater than 40 grams per inch (1.6 g/mm) and a thickness of at most 25 microns.
DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for making a **battery** separator.
USE - For use in electrochemical cells including primary (non-rechargeable) and secondary (rechargeable) **batteries**, e.g. **batteries** based on lithium chemistry, and capacitors.
ADVANTAGE - The **battery** separator has a peel strength of greater than 40 grams per inch (1.6 g/mm) and a thickness of at most 25 (preferably at most 15) microns.
Dwg.0/0
TECH EP 1505671 A2 UPTX: 20050308
TECHNOLOGY FOCUS - POLYMERS - The tri-layered **film** has a **polypropylene-polyethylene-polypropylene** structure.
FS CPI EPI
FA AB
MC CPI: A11-B09A2; A12-E06B; A12-E07B; L03-E01A
EPI: X16-F02

L25 ANSWER 2 OF 15 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
AN 2004-145694 [15] WPIX
DNN N2004-116080 DNC C2004-058777
TI Lithium cell for use as lithium ion polymer **battery**, first polymer in at least one of electrodes, and **separator** comprising **second** polymer different from first polymer and having melting point lower than that of first polymer.
DC A85 L03 X16
IN COCHRAN, S D; MACLEAN, G K
PA (DELP-N) DELPHI TECHNOLOGIES INC; (COCH-I) COCHRAN S D; (MACL-I) MACLEAN G K; (ENER-N) ENERDEL INC
CYC 32
PI EP 1385228 A2 20040128 (200415)* EN 8 H01M010-40
R: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR
US 2004018428 A1 20040129 (200415) H01M004-62
US 7008724 B2 20060307 (200618) H01M004-02
ADT EP 1385228 A2 EP 2003-77066 20030702; US 2004018428 A1 US 2002-202310 20020724; US 7008724 B2 US 2002-202310 20020724
PRAI US 2002-202310 20020724
IC ICM H01M004-02; H01M004-62; H01M010-40
ICS H01M002-16; H01M004-36; H01M004-60; H01M010-04
AB EP 1385228 A UPAB: 20040302
NOVELTY - A lithium cell comprises a first electrode, a **second** electrode, and **separator** in between the electrodes; a first polymer in at least one of the electrodes; and a **separator** comprising a **second** polymer different from the first polymer and having a m.pt. lower than that of the first polymer.
DETAILED DESCRIPTION - INDEPENDENT CLAIMS are also included for:
(a) **battery** cell comprising a first electrode layer and a second electrode layer, each comprising a copolymer from first polymer to third polymer; a **separator** layer comprising a **second**

polymer that has m.pt. below that of the first polymer and below that of third polymer, the separator layer between the electrode layers and having first electrode-contacting surface and a second electrode-contacting surface; a first current collector layer adjacent the first electrode layer at a surface opposite its separator-contacting surface, and a second current collector layer adjacent the second electrode layer at a surface opposite its separator-contacting surface;

(b) production of lithium cell comprising providing at least one anode and one cathode; providing a separator layer; and providing the separator layer between the anode and the cathode under conditions to adhere the anode and the cathode to the separator to form a cell;

(c) adhering a current collector **film** on an electrode in a lithium cell, comprising providing a polyvinylidene fluoride homopolymer to the electrode under conditions to adhere the **film** to the electrode; and

(d) minimization of swelling of a polymer in an electrode of a lithium cell having a separator layer comprising providing a polymer from first polymer or third polymer in first and second electrodes; providing a second polymer having a m.pt. below that of first polymer and third polymer; and providing conditions to adhere the separator and the electrodes.

The first and second electrode layers are each adhered to the separator layer at their respective first and second electrode-contacting surfaces, and the first and second current collector layers are each adhered to their respective first and second electrodes at surfaces opposite their respective separator-contacting surfaces.

USE - For use as lithium ion polymer **battery** (claimed).

ADVANTAGE - The lithium cell has polymers that allow high temperature drying of the electrodes, and with less swelling of the polymer and less resulting loss of electrical conductivity in the electrode, and yield good adhesion of the electrodes to the separator.

Dwg.0/0

TECH EP 1385228 A2 UPTX: 20040302

TECHNOLOGY FOCUS - POLYMERS - Preferred Component: The second polymer is in and/or on the separator. It is in the first or second electrode, and a third polymer is in the electrode not containing the first polymer. Preferred Material: The first, second and third polymers are polyvinylidene fluoride, polyvinylidene chloride fluoride, polyvinylidene chloride, polyvinyl chloride, polyvinylchloride acetates, polyacrylonitriles, polyfluoroethylenes, polyfluoropropylenes, polyolefins, acrylic acid modified **polyethylene**, maleic acid modified **polyethylene**, acrylic acid modified **polypropylene**, maleic acid modified **polypropylene**, polyvinyl alcohols, polyglycols, polyacetates, polyesters, polyacrylates, polycarbonates, **polyethylene** oxides, **polypropylene** oxides, polyacrylic acid esters, cellulose acetates, cellulose butyrate, nylons, polyurethanes, polyterephthalates and/or polystyrenes. The first polymer is polyvinylidene fluoride (PVDF) and the second polymer comprises PVDF and hexafluoropropylene (HFP).

TECHNOLOGY FOCUS - METALLURGY - Preferred Component: The first current collector layer comprises copper and the first electrode layer is anode. The second current collector layer comprises aluminum and the second electrode layer is cathode.

TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Method: The conditions comprise heating to a temperature to dry the electrodes and cause the second polymer to adhere the separator layer to the electrodes.

FS CPI EPI

FA AB

MC CPI: A12-E06A; A12-E06B; L03-E01A; L03-E01B5B; L03-E01B9A
EPI: X16-B01F1; X16-E09; X16-F02

L25 ANSWER 3 OF 15 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
AN 2004-068704 [07] WPIX
CR 2001-457122 [49]; 2003-246871 [24]; 2003-255421 [25]; 2003-894916 [82]
DNN N2004-055259 DNC C2004-028234
TI Production of **battery** separator, for lead acid **battery**, comprises forming grafting sites on non-woven sheet of polyolefin fibers, and reacting monomeric acrylic acid or other vinyl monomer with fibers at grafting sites.
DC A85 F06 L03 X16
IN CHOI, W M
PA (CHOI-I) CHOI W M; (KVGT-N) KVG TECHNOLOGIES INC
CYC 100
PI US 2002165291 A1 20021107 (200407)* 13 C08F002-46
US 6680144 B2 20040120 (200407) H01M004-02
WO 2003012893 A2 20030213 (200407) EN H01M000-00
RW: AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SK SL SZ TR TZ UG ZM ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG US UZ VN YU ZA ZM ZW
AU 2002317594 A1 20030217 (200452) C08F002-46
AU 2002317594 A8 20051013 (200611) H01M004-02
ADT US 2002165291 A1 Cont of US 1999-429820 19991029, CIP of US 2000-697962 20001027, Provisional US 2001-308983P 20010730, US 2002-140033 20020506; US 6680144 B2 CIP of US 1999-429820 19991029, CIP of US 2000-697962 20001027, Provisional US 2001-308983P 20010730, US 2002-140033 20020506; WO 2003012893 A2 WO 2002-US24039 20020730; AU 2002317594 A1 AU 2002-317594 20020730; AU 2002317594 A8 AU 2002-317594 20020730
FDT US 2002165291 A1 CIP of US 6384100; US 6680144 B2 CIP of US 6384100; AU 2002317594 A1 Based on WO 2003012893; AU 2002317594 A8 Based on WO 2003012893
PRAI US 2001-308983P 20010730; US 1999-429820 19991029;
US 2000-697962 20001027; US 2002-140033 20020506
IC ICM C08F002-46; H01M000-00; H01M004-02
ICS C08F002-48; C08F002-54; C08F255-00; C08F255-04; C08J003-28; H01M002-16; H01M006-42
AB US2002165291 A UPAB: 20060214
NOVELTY - Grafting sites are formed on non-woven sheet of polyolefin fibers by subjecting sheet to glow discharge plasma or to electron beam irradiation. The resulting sheet is contacted with monomeric acrylic acid or other vinyl monomer capable of reacting with acid or base to form salt directly or indirectly. The acrylic acid or vinyl monomer is made to react with the fibers at the grafting sites.

DETAILED DESCRIPTION - Grafting sites are formed on a non-woven sheet of polyolefin fibers by subjecting the sheet to glow discharge plasma or to electron beam irradiation. The resulting sheet is contacted with monomeric acrylic acid or another vinyl monomer capable of reacting with an acid or base to form a salt directly or indirectly. The acrylic acid or other vinyl monomer is made to react with the polyolefin fibers at the grafting sites by irradiating the grafting sites on the fibers with gamma or electron beam radiation while the acrylic acid or other vinyl monomer is in contact with the fiber surfaces, irradiating the grafting sites on the fibers with ultraviolet light while the acrylic acid or other vinyl monomer is in contact with the fiber surfaces and the non-woven sheet is in an inert gas atmosphere, or by heating the fibers while the acrylic

acid or other vinyl monomer is in contact with the fiber surfaces, to produce a **battery** separator.

INDEPENDENT CLAIMS are included for the following:

(1) A **battery** separator comprising first layer(s) of a fabric containing polyolefin fibers, and second layer(s) which is a wet-laid or dry-laid glass fiber sheet, a porous polymer **film**, a melt-blown web of polymer fibers, a dry-laid web of glass fibers and polymer fibers, or a woven glass or polymer fiber web. The polyolefin fibers comprise 20-80 weight% (weight%) of dividable fibers (35) of **polypropylene** segments (37) and **polyethylene** segments (36), and 10-50 weight% of sheath-core fibers with a **polypropylene** core and a **polyethylene** sheath. Provided that the surfaces of the polyolefin fibers are hydrophilic as a consequence of exposure to plasma discharge in the presence of oxygen, nitrogen and/or argon and the layers of separator are bonded together; and

(2) A **battery** comprising at least one positive plate, at least one negative plate, an anode, a cathode, electrical conductors operably connecting plates, anode and cathode and a **battery** separator between adjacent positive and negative plates.

USE - For producing a **battery** separator for **battery** , especially lead acid **battery**, nickel-couple **battery**, nickel-cadmium **battery**, nickel-zinc **battery** and nickel-iron **battery** (claimed).

ADVANTAGE - By providing hydrophilic surface on polyolefin fibers, non-woven sheet of the fibers with the hydrophilic surfaces can be used as **battery** separator. Production of **battery** separator from sheets of polyolefin fibers is improved.

DESCRIPTION OF DRAWING(S) - The figure shows the perspective view of dividable fiber which can be a component of a fabric and can be treated to have a hydrophilic surface.

Dividable fiber 35

Polyethylene segments 36

Polypropylene segments 37

Dwg.3/4

TECH US 2002165291 A1UPTX: 20040128

TECHNOLOGY FOCUS - POLYMERS - Preferred Process: The non-woven sheet on which grafting sites have been formed is contacted with the both acrylic acid or other vinyl monomer and 2-50 weight% of a copolymerizable monomer. The copolymerizable monomer is of formulae (I-IV), preferably triallyl isocyanurate, triallyl cyanurate, 1,5-hexadiene-3-ol, 2,5-dimethyl-1,5-hexadiene, 1,5-hexadiene, 1,7-octadiene, 3,7-dimethyl-2,6-octadiene-1-ol, **polyethylene** glycol diacrylate, dimethyl acrylate or divinyl benzene. A coating of an ethylenically unsaturated monomer which is polymerizable by addition polymerization to a thermoplastic polymer which is hydrophilic due to presence of carboxyl, hydroxyl, sulfonyl, sulfonic acid or carbonyl groups, or a monomer of formula (I-IV), is applied to the fibers of a non-woven sheet with thickness of 50-300 microns and comprising polyolefin fibers with an average fiber diameter of 0.2-30 microns and a surface area of more than 0.2 m2/g, and the monomer is polymerized in situ on the fiber surfaces, to produce **battery separator.** The first and **second** layers of the **battery** separator are chemically or thermally bonded together or mechanically entangled or hydroentangled together. The polymerizable coating is applied by introducing the non-woven sheet through an atmosphere of the coating in vapor form and removing heat from the sheet to cause the coating to condense. The fibers of the non-woven sheet is subjected to glow discharge to make the surfaces of the fibers hydrophilic. The fibers of the non-woven sheet before the coating of monomer is applied, are subjected to electron beam irradiation with total dose of 3-10 M rads. The monomer is a mixture of acrylic acid and

p-styrene sulfonic acid.
R = 2-8C aliphatic or aromatic hydrocarbon group;
R4 = hydrogen or methyl;
n = 2-15;
X+ = cation chosen from hydrogen, alkali metal cation, alkaline earth cation, cations of transition metals scandium, titanium, vanadium, chromium, manganese, iron, cobalt, nickel, copper and zinc, and ammonium cations of formula (V);
R5-R8 = hydrogen, (cyclo)alkyl, or (cyclo)alkenyl and not more than one is a bivalent group bonded to N+; and
R5+R6+R7+R8 = at most 21C.

ABEX US 2002165291 A1UPTX: 20040128
EXAMPLE - A non-woven web was produced from dividable fibers (in weight parts) (60) comprising four polyethylene segments which were pie-shaped and four polypropylene segments which were pie-shaped, and sheath-core fibers (40) comprising polypropylene core and polyethylene sheath. The dividable fibers had an average diameter of 10-100 microns, and the sheath-core fibers had average diameter of 10 microns and surface area of 0.3 m2/g. The dividable and sheath-core fibers were suspended in a gaseous medium, collected as a web of non-woven fabric with thickness of 300 microns and weight of 40-80 g/m2, and wound on a roll. The non-woven fabric produced was then treated by plasma discharge at 50 watts to make the surfaces of the fibers hydrophilic, so that the fabric was suitable for use as separator material.

FS CPI EPI
FA AB; GI
MC CPI: A04-G01E; A04-H00H; A11-B05E; A11-C04E; A12-E06B; F03-C; F03-C05; F03-E01; F04-E; F04-F03; L03-E01A
EPI: X16-B01A1; X16-B01A3; X16-B01B; X16-F02

L25 ANSWER 4 OF 15 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
AN 2004-059450 [06] WPIX
DNN N2004-048089 DNC C2004-024430
TI Making rechargeable polymer lithium ion **battery** involves depositing adherent particles from polymer-fluid element on electrodes and separator element and having electrolyte from electrolyte active species element.
DC A85 L03 X16
IN HUANG, S
PA (HUAN-I) HUANG S
CYC 2
PI US 2003194607 A1 20031016 (200406)* 12 H01M002-02
CN 1450681 A 20031022 (200406) H01M010-38
US 7008722 B2 20060307 (200618) H01M006-18
ADT US 2003194607 A1 Provisional US 2002-380171P 20020506, US 2002-313056 20021206; CN 1450681 A CN 2002-108832 20020410; US 7008722 B2 Provisional US 2002-380171P 20020506, US 2002-313056 20021206
PRAI CN 2002-108832 20020410
IC ICM H01M002-02; H01M006-18; H01M010-38
ICS H01M006-24; H01M010-04; H01M010-40
AB US2003194607 A UPAB: 20040123
NOVELTY - A rechargeable polymer lithium ion **battery** is made by deposing adherent particles from polymer-fluid (P-fluid) element on the surfaces of electrodes and sides of separator element and having electrolyte from electrolyte active species (E-solution) element absorbed in the micropores of the electrodes and separator element during **battery** assembly process.
DETAILED DESCRIPTION - Making of rechargeable polymer lithium ion **battery** comprises forming a **battery** cell using a negative electrode (16), positive electrode (18) and separator element

(20), and placing the **battery** cell into a soft package **film** element. Each electrode has multiple surfaces, and the separator element is microporous member having multiple sides. Adherent particles are deposited from a P-fluid element on to the surfaces of the electrodes and sides of the separator element and having electrolyte from an E-solution element absorbed in to micropores of the electrodes and separator element during **battery** assembly process. The **battery** in the soft package **film** element is cured to result in a packaged **battery** (10) cell. The P-fluid element is a polymer fluid for depositing adherent particles onto separators, which will bond the anode and cathode onto the separators. The E-solution element is a liquid electrolyte solution, comprising lithium salts and solvents to form polymer gelling electrolyte.

USE - For making lithium ion **battery**.

ADVANTAGE - The method provides a polymer lithium ion **battery** with a self-supporting and self-strengthening cell, and soft packaging laminate.

DESCRIPTION OF DRAWING(S) - The drawing shows a cross-sectional view of the polymer-gel **battery** with multi-layered jelly roll.

Battery 10

jelly roll 12

Negative electrode 16

Positive electrode element 18

Separator element 20

Dwg.1/4

TECH US 2003194607 A1UPTX: 20040123

TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Components: The **separator** element is a **multi-layer** microporous membrane and the soft package **film** element comprises a multi-layered metal plastic laminate. The negative and positive electrodes are sandwiched with microporous separators and further wound into a jelly roll (12) cell or stacked into a flat cell. The separator element is a thermal shutdown separator, having a porosity of 25-65% and thickness of 3-100 microns. The soft package **film** is multi-layered metallic plastic laminate containing aluminum barrier.

Preferred Method: The method further includes performing a chemical liquid deposition (CLD) and a polymer gel formation (PGF). The step of depositing adherent particles comprises injecting the polymer fluid (P-fluid) into the packaged **battery** cell; extracting solvent from the P-fluid under a vacuum, filling the packaged **battery** cell with a solution of electrolyte active species (E-solution) after the CLD process, and curing said packaged **battery** cell by heating. The CLD and PGF self-strengthen and self-support the **battery** cell. The extracting of solvent from the P-fluid is carried out under a vacuum at 25-80 degrees C for 5-500 seconds to recrystallize polymer from the P-fluid into particles. The curing is carried out at 40-160 degrees C for 10-3000 seconds under 5-100 psi/each cell. The CLD and PGF processes may be combined together using a mixture of P-fluid and E-solution in place of the polymer fluid and eliminating the curing step.

Preferred Parameters: The mixture has P-fluid and E-solution ratio of 0.01-0.17. The particles have sizes of 0.01-5 mum and surface density of 0.01-0.4 mg/cm2.

TECHNOLOGY FOCUS - POLYMERS - Preferred Components: The P-fluid is solution or suspension of polymers such as **polyethylene** (**PE**), **polypropylene** (**PP**), polymethylpentene (PMP), polyvinylidene fluoride (PVDF), **polyethylene** oxide (PEO), polyurethane, polyacrylate, polyacrylonitrile, polymethylacrylate, polyacrylamide, polyvinylacetate, polyvinylpyrrolidone, and copolymers such as PVDF:hexafluoropropylene (HFP). It may be dissolved or dispersed

in solvent(s).

TECHNOLOGY FOCUS - ORGANIC CHEMISTRY - Preferred Materials: The negative electrode element is made of carbonaceous materials, such as graphite, carbon black, petroleum coke, activated carbon, nano carbon tubes, carbon fibers and graphite fibers. It can also be made from non-carbonaceous materials, such as metal oxides, alloys and intermetallic compounds. The positive electrode element is made from lithium intercalation compounds, such as lithium-based oxides, sulfides, phosphate, chlorides and fluorides. The solvents can be styrene, acetone, acetonitrile, dimethyl carbonate, dimethyl formamide, dimethyl phthalate, methyl ethyl ketone, n-methyl-2-pyrrolidinone, propylene carbonate, propylene glycol ethyl ether, or tetrahydrofuran. The solvents of the E-solution are propylene carbonate, ethylene carbonate, diethyl carbonate, dimethyl carbonate, y-butylactone, dimethyl sulfoxide, dimethoxyethane, tetrahydrofuran, and/or sulfolane.
Preferred Compositions: The P-fluid further comprises 0.01-40% dibutyl phthalate as a plasticizer when adherent particles that are deposited on polyolefin separators reach the high side of surface density.

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Components: The lithium salts of the E-solution are ClO4-, BF4-, PF6-, AsF6-, SbF6-, CH3CO-2-, CF3SO3-, N(CF3SO2)2-, and/or C(CF3SO2)2-.

FS CPI EPI
FA AB; GI
MC CPI: A12-E06A; A12-E06B; L03-E01A; L03-E01B5B; L03-E01B9A
EPI: X16-B01; X16-B01F1; X16-E08A; X16-F01; X16-F02

L25 ANSWER 5 OF 15 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
AN 2003-744651 [70] WPIX
CR 2003-415394 [39]
DNN N2003-596411 DNC C2003-204610
TI Bipolar electrochemical **battery** comprises stack of at least two electrochemical cells electrically arranged in series and including negative and positive electrodes, separator, and two electrically conductive laminations.
DC A85 L03 X16
IN KLEIN, M G; PLIVELICH, R; RALSTON, P
PA (KLEI-I) KLEIN M G; (PLIV-I) PLIVELICH R; (RALS-I) RALSTON P; (ELEC-N) ELECTRO ENERGY INC
CYC 1
PI US 2003138691 A1 20030724 (200370)* 19 H01M010-18
US 6887620 B2 20050503 (200530) H01M006-48
ADT US 2003138691 A1 Cont of US 2001-902871 20010711, US 2003-337816 20030106; US 6887620 B2 Cont of US 2001-902871 20010711, US 2003-337816 20030106
FDT US 2003138691 A1 Cont of US 6503658; US 6887620 B2 Cont of US 6503658
PRAI US 2001-902871 20010711; US 2003-337816 20030106
IC ICM H01M006-48; H01M010-18
ICS H01M002-08; H01M004-52; H01M004-58; H01M004-62; H01M004-66
AB US2003138691 A UPAB: 20050512
NOVELTY - A bipolar electrochemical **battery** comprises a stack of at least two electrochemical cells electrically arranged in series. Each electrochemical cell comprises negative and positive electrodes, a **separator**, and first and **second** electrically conductive laminations. The laminations are sealed peripherally to form an enclosure including the electrodes, separator and electrolyte.
DETAILED DESCRIPTION - A bipolar electrochemical **battery** comprises a stack of at least two electrochemical cells electrically arranged in series, with the positive face of each cell contacting the negative face of an adjacent cell. Each electrochemical cell comprises a

negative electrode (2), a positive electrode (3), a separator (4) between the electrodes and including an electrolyte, a first electrically conductive lamination (5) in electrical contact with the outer face of negative electrode, and a second electrically conductive lamination (6) in electrical contact with the outer face of positive electrode. Each conductive lamination includes an inner metal layer (7, 7a), and a polymeric outer layer (8, 8a) having perforation(s) (9, 9a) to expose the inner metal layer. The first and second laminations are sealed peripherally to each other to form an enclosure including the electrodes, separator, and electrolyte.

An INDEPENDENT CLAIM is also included for fabrication of bipolar electrochemical **battery** by providing a stack of at least two electrochemical cells, each comprising negative and positive electrodes, **separator**, and first and **second** electrically conductive laminations; and sealing the first and second laminations peripherally to each other to form an enclosure.

USE - For use as electrochemical **battery**.

ADVANTAGE - The inventive **battery** has high energy storage capacity, efficient **battery** performance, and long-term chemical and physical stability.

DESCRIPTION OF DRAWING(S) - The figure shows an overview of a wafer cell.

Negative electrode 2
Positive electrode 3
Separator 4
First conductive lamination 5
Second conductive lamination 6
Inner metal layers 7, 7a
Polymeric outer layers 8, 8a
Perforations 9, 9a

Dwg.1/10

TECH US 2003138691 A1UPTX: 20031030

TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Components: The electrodes, separator and laminations are flat. Each inner metal layer is a metal foil having a thickness of 0.0003 - 0.005 inch. Each polymeric outer layer is a thin polymeric **film** having a thickness of 0.001 - 0.005 inch. Each polymeric outer layer comprises perforations aligned with respect to each other to create contact points through which current can flow from cell to cell. The metal foil and polymeric layer are bonded together with tar, epoxy, or rubber cement. The separator is porous. A conductive paste or cement is present between the metal layer and electrode. The stack of electrochemical cells is contained in a **battery** housing. A pressure measuring device is included in the sealed **battery** housing. At least one of the end cells of the stack is in contact with a metal foil contact, and the metal foil contact is electrically connected to a **battery** terminal. The electrochemical cells are held in compression by a gas filled bladder. The cells may include vent ports. A metal foil is placed between cells for thermal conduction, and a cell edge is extended for improved thermal contact to **battery** housing walls.

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Materials: Each inner metal layer is made of copper, aluminum, silver, steel, lithium, nickel, and/or metal plated material. The positive electrode comprises oxygen, magnesium, nickel, manganese, copper, cobalt, silver, lithium, and/or oxide or hydroxide of nickel, manganese, copper, mercury, silver, magnesium, lithium and/or cobalt. The positive electrode may be an oxygen or a nickel electrode. The nickel electrode is pasted foam, sintered and plastic bonded nickel electrode. The negative electrode comprises cadmium, iron, zinc, silver, lithium, carbon containing lithium, and/or hydrogen.

The negative electrode is nickel hydride, copper hydride, lithium hydride, and/or iron hydride electrode.

TECHNOLOGY FOCUS - POLYMERS - Preferred Materials: Each polymeric outer layer is made of **polypropylene**, **polyethylene**, polysofon, and/or polyvinyl chloride.

FS CPI EPI
FA AB; GI
MC CPI: A11-C01C; A12-E06; L03-E01D3
EPI: X16-E01C1; X16-E01E; X16-E02; X16-E09; X16-F01A; X16-F06

L25 ANSWER 6 OF 15 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
AN 2003-625575 [59] WPIX
DNC C2003-170933
TI Electrochemical cell, e.g. **batteries** for flashlights, comprises a separator with a free standing reinforced edge which provides structural support to the separator after absorbing the electrolyte.
DC A85 L03
IN JANMEY, R M
PA (JANM-I) JANMEY R M; (EVEY) EVEREADY BATTERY CO INC
CYC 101
PI US 2003082443 A1 20030501 (200359)* 17 H01M002-18
WO 2003038928 A1 20030508 (200359) EN H01M002-14
RW: AT BE BG CH CY CZ DE DK EA EE ES FI FR GB GH GM GR IE IT KE LS LU MC MW MZ NL OA PT SD SE SK SL SZ TR TZ UG ZM ZW
W: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ OM PH PL PT RO RU SD SE SG SI SK SL TJ TM TN TR TT TZ UA UG US UZ VN YU ZA ZM ZW
EP 1438759 A1 20040721 (200447) EN H01M002-14
R: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR
AU 2002343510 A1 20030512 (200464) H01M002-14
US 6828061 B2 20041207 (200480) H01M002-18
JP 2005508070 W 20050324 (200523) 53 H01M006-08
CN 1575526 A 20050202 (200532) H01M002-14
ADT US 2003082443 A1 US 2001-2577 20011026; WO 2003038928 A1 WO 2002-US32830 20021015; EP 1438759 A1 EP 2002-780455 20021015, WO 2002-US32830 20021015; AU 2002343510 A1 AU 2002-343510 20021015; US 6828061 B2 US 2001-2577 20011026; JP 2005508070 W WO 2002-US32830 20021015, JP 2003-541081 20021015; CN 1575526 A CN 2002-821333 20021015
FDT EP 1438759 A1 Based on WO 2003038928; AU 2002343510 A1 Based on WO 2003038928; JP 2005508070 W Based on WO 2003038928
PRAI US 2001-2577 20011026
IC ICM H01M002-14; H01M002-18; H01M006-08
ICS H01M002-16; H01M010-04; H01M010-28
AB US2003082443 A UPAB: 20030915
NOVELTY - An electrochemical cell includes a separator forming a lining on an interior surface of a cavity of an electrode. The separator has a free standing reinforced edge forming an interface between the electrodes. The reinforced edge includes a reinforcing material that provides structural support to the separator after the separator has absorbed the electrolyte.
DETAILED DESCRIPTION - An electrochemical cell comprises:
(i) a container with an open end, a closed end and a sidewall;
(ii) first electrode (50) defining a cavity with an interior surface;
(iii) electrolyte within the container and in contact with the first electrode;
(iv) a separator (20) forming a lining on the interior surface (56) of the cavity;

(v) a second electrode (60) within the separator lined cavity; and
(vi) closure assembly (70) secured to the open end of the container.
The separator comprises a free standing reinforced edge which extends beyond the first electrode toward the open end of the container and forms an interface between the electrodes. The reinforced edge includes a reinforcing material which provides structural support to the free standing reinforced edge of the separator after the separator has absorbed the electrolyte.

An INDEPENDENT CLAIM is also included for manufacturing the above electrochemical cell by providing a strip of separator, coating the edge of the separator with a reinforcing material, coiling the coated strip to form a tube comprising non-coated portion and a coated reinforced edge, providing a container having an open end and comprising a first electrode defining a cavity, inserting the coiled tube into the cavity, inserting a second electrode into the tube defined by the coiled separator, and closing the container by securing a closure assembly to the open end of the container.

USE - Used as an electrochemical cell e.g. as a **battery** for flashlights, radios or cameras.

ADVANTAGE - The reinforced edge serves to contain fragmented pieces from one of the cell's electrodes that may become dislodged when the cell is dropped, thus preventing the formation of an internal short circuit.

DESCRIPTION OF DRAWING(S) - The figure is a partial cross-sectional view of the cell.

Separator 20
Electrode 50
Electrode 60
Interior surface 56
Closure assembly 70
Closure member 72

Dwg.8/13

TECH US 2003082443 A1UPTX: 20030915

TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Component: The closure assembly comprises a low profile closure member (72). The separator includes a first region located beyond the interface of the electrode and below the closure assembly and a second region located between the first and second electrodes. The first region comprises a reinforcing material, while the second region does not comprise the material. The reinforced edge is parallel to the container's sidewall. The separator comprises a flexible porous **film** of nonwoven fibers with a first and second broad surface. The material coats the fibers in the reinforced edge to prevent absorption of the electrolyte or permeates through the pores of the separator. The separator is a tube with an open end and is formed by coiling the separator. It includes first and **second** shaped strips of **separator** material with respective central region and two parallel edges. The reinforcing material covers less than 20, preferably less than 1% of the electrode's interfacial surface area.

TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - Preferred Component: The second electrode is a frangible gel comprising an aqueous solution of potassium hydroxide.

TECHNOLOGY FOCUS - POLYMERS - Preferred Material: The reinforced edge comprises a material consisting of **polyethylene**, **polypropylene**, polyamides, paraffin, methylcellulose or chitosan.

FS CPI
FA AB; GI
MC CPI: A12-E06; L03-E01A; L03-E01B; L03-E01B8; L03-E01D1; L03-E01D3

L25 ANSWER 7 OF 15 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
AN 2003-119756 [11] WPIX
DNN N2003-095405 DNC C2003-030827
TI **Multilayer separator** for **battery** such as lithium secondary **battery**, has microporous **film** with face-to-face bonded identical co-extruded multilayered portions.
DC A85 L03 P73 X16
IN CALL, R W; SIMMONS, D K; YU, T
PA (CELG-N) CELGARD INC; (CALL-I) CALL R W; (SIMM-I) SIMMONS D K; (YUTT-I) YU T
CYC 38
PI US 2002136945 A1 20020926 (200311)* 9 H01M002-16
EP 1348540 A1 20031001 (200365) EN B32B027-32
R: AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IT LI LT LU LV MC MK NL PT RO SE SI SK TR
JP 2003297330 A 20031017 (200370) 10 H01M002-16
CA 2418600 A1 20030927 (200374) EN H01M002-14
CN 1447460 A 20031008 (200403) H01M002-14
KR 2003077998 A 20031004 (200410) H01M002-14
SG 106691 A1 20041029 (200476) B32B027-32
TW 589757 A 20040601 (200482) H01M002-14
TW 2003006030 A 20031101 (200557) H01M002-14
ADT US 2002136945 A1 Cont of US 2000-484184 20000118, US 2002-107781 20020327; EP 1348540 A1 EP 2003-5042 20030306; JP 2003297330 A JP 2003-84357 20030326; CA 2418600 A1 CA 2003-2418600 20030207; CN 1447460 A CN 2003-107233 20030318; KR 2003077998 A KR 2003-18467 20030325; SG 106691 A1 SG 2003-3127 20030313; TW 589757 A TW 2003-103675 20030221; TW 2003006030 A TW 2003-103675 20030221
PRAI US 2000-484184 20000118; US 2002-107781 20020327
IC ICM B32B027-32; H01M002-14; H01M002-16
ICS B32B005-32; B32B027-08; C08J009-26; H01M002-18
AB US2002136945 A UPAB: 20030214
NOVELTY - A microporous **film** has two identical co-extruded multilayered portions (32, 32') that are bonded face-to-face. The extruded multilayered portions have respective rigid layers (34, 34' and 38, 38') and shutdown layers (36, 36').

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is included for a method of manufacturing a **multilayer separator**.

USE - **Multilayer** porous **separator** for a **battery** e.g. a lithium secondary **battery**.

ADVANTAGE - The **battery** separator is relatively thin with improved puncture strength. The separator exhibits a low degree of electrical resistance and is stable by using specific polymers.

DESCRIPTION OF DRAWING(S) - The figure depicts a cross-sectional view of the **battery** separator.

Co-extruded multilayered portions 32, 32'
Rigid layers 34, 34', 38, 38'
Shutdown layers 36, 36'

Dwg.3/8
TECH US 2002136945 A1UPTX: 20030214
TECHNOLOGY FOCUS - POLYMERS - Preferred Materials: The rigid layer is made of **polypropylene**. The shutdown layer is made of **polyethylene**. The **film** comprises layers consisting of **polyethylene** and **polypropylene**.

TECHNOLOGY FOCUS - INDUSTRIAL STANDARDS - Preferred Properties: The **battery** separator has Gurley value of 5 to 100 seconds, preferably from 10 to 60 seconds as measured by the method of ASTM D-726 (B).
FS CPI EPI GMPI
FA AB; GI

MC CPI: A12-E06B; L03-E01A
EPI: X16-B01F1; X16-F02

L25 ANSWER 8 OF 15 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
AN 2002-707116 [76] WPIX
DNN N2002-557472 DNC C2002-200657
TI Electrochemical element for use in e.g. supercapacitors, has **multi -layer separator film** interposed between each stack of electrochemical cells.
DC A32 A85 L03 S03 V01 X16
IN AHN, B I; AHN, S H; CHO, J Y; KYUNG, Y J; LEE, H G; LEE, H M; LEE, S J; LEE, S Y; PARK, S Y; SONG, H S; YONG, H H; AHN, B; AHN, S; CHO, J; KYUNG, Y; LEE, H; LEE, S; PARK, S; SONG, H; YONG, H
PA (GLDS) LG CHEM LTD; (GLDS) LG CORP; (AHNB-I) AHN B; (AHNS-I) AHN S; (CHOJ-I) CHO J; (KYUN-I) KYUNG Y; (LEEH-I) LEE H; (LEES-I) LEE S; (PARK-I) PARK S; (SONG-I) SONG H; (YONG-I) YONG H
CYC 24
PI WO 2002071509 A1 20020912 (200276)* EN 56 H01M002-14
RW: AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
W: CN JP US
KR 2002071204 A 20020912 (200311) H01M002-14
EP 1285468 A1 20030226 (200319) EN H01M002-14
R: AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
US 2003104273 A1 20030605 (200339) H01M002-16
CN 1457517 A 20031119 (200412) H01M002-14
KR 406690 B 20031121 (200423) H01M002-14
JP 2004519824 W 20040702 (200443) 78 H01M002-02
US 7014948 B2 20060321 (200621) H01M002-16
ADT WO 2002071509 A1 WO 2002-KR377 20020305; KR 2002071204 A KR 2001-11192 20010305; EP 1285468 A1 EP 2002-705524 20020305, WO 2002-KR377 20020305; US 2003104273 A1 WO 2002-KR377 20020305, US 2002-258170 20021022; CN 1457517 A CN 2002-800518 20020305; KR 406690 B KR 2001-11192 20010305; JP 2004519824 W JP 2002-570324 20020305, WO 2002-KR377 20020305; US 7014948 B2 WO 2002-KR377 20020305, US 2002-258170 20021022
FDT EP 1285468 A1 Based on WO 2002071509; KR 406690 B Previous Publ. KR 2002071204; JP 2004519824 W Based on WO 2002071509; US 7014948 B2 Based on WO 2002071509
PRAI KR 2001-11192 20010305
IC ICM H01M002-02; H01M002-14; H01M002-16
ICS C08K003-10; C08K003-22; C08L101-00; H01M010-40
AB WO 200271509 A UPAB: 20021125
NOVELTY - An electrochemical element comprises electrochemical cells which are stacked with a separator **film** interposed between each stacked cell. The separator **film** consists of a polymeric support layer **film** and a porous gellable polymer layer formed on side(s) of the support layer. The support and polymer layers are joined with each other without an interface between them.

USE - For use in supercapacitors, ultracapacitors, primary **batteries**, secondary **batteries**, fuel cells, sensors, electrolysis devices, and electrochemical reactors.

ADVANTAGE - The inventive electrochemical element has improved energy density. It is more convenient to manufacture and utilizes space more efficiently than conventional electrochemical element. It provides unique but simple cell structure capable of maximizing the content of electrode active material.

DESCRIPTION OF DRAWING(S) - The figure shows a layered structure of a full cell.

Positive electrode 7
Negative electrode 8
Separator layer 15

Dwg.1A/10

TECH WO 200271509 A1UPTX: 20021125

TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Method: The electrochemical cells are formed by stacking (i) full cells having positive electrode (7), separator layer (15) and negative electrode (8) as a basic unit with separator **film** interposed between each stacked cell; or (ii) bicells having positive electrode, separator layer, negative electrode, another separator layer and another positive electrode, or bicells having negative electrode, separator layer, positive electrode, another separator layer and another negative electrode as basic unit with separator **film** between each stacked cell. The separator **film** is prepared by providing a polymeric support layer, dissolving a gellable polymer in solvent to form a gellable polymer solution, coating the support layer with gellable polymer solution to form a multi-layer **film**, and stretching and heat-setting the multi-layer **film**. Heat-setting is performed under tension at 50degreesC or at polymer melting point for 10 seconds - 1 hour. The support layer is prepared by injecting the polymer into an extruder equipped with T-die or tubular die, and annealing the extruded polymer in dry oven at room temperature to polymer melting point.

TECHNOLOGY FOCUS - POLYMERS - Preferred Materials: The support layer is made of high-density **polyethylene**, low-density **polyethylene**, linear low-density **polyethylene**, **polypropylene**, high-crystalline **polypropylene**, **polyethylene**-propylene copolymer, **polyethylene**-butylene copolymer, **polyethylene**-hexene copolymer, **polyethylene** -octene copolymer, polystyrene-butylene-styrene copolymer, polystyrene-ethylene-butylene-styrene copolymer, polystyrene, polyphenylene oxide, polysulfone, polycarbonate, polyester, polyamide, polyurethane, polyacrylate, polyvinylidene chloride, polyvinylidene fluoride (PVDF), polysiloxane, polyolefin ionomer, polymethyl pentene, hydrogenated oligocyclopentadiene, and/or its copolymer or derivative. The gellable polymer layer is made of PVDF, PVDF-chlorotrifluoroethylene copolymer, PVDF-hexafluoropropylene copolymer, **polyethylene** oxide, **polypropylene** oxide, polybutylene oxide, polyurethane, polyacrylonitrile, polyacrylate, polymethyl methacrylate, polyacrylic acid, polyamide, polyacrylamide, polyvinyl acetate, polyvinylpyrrolidone, polytetraethylene glycol diacrylate, polysulfone, polyphenylene oxide, polycarbonate, polyester, polyvinylidene chloride, polysiloxane, polyolefin ionomer, and/or its copolymer or derivative. Preferred Composition: The gellable polymer layer comprises lithium salt(s) (i.e. lithium thiocyanate, lithium perchlorate, LiCF3SO3, lithium hexafluoroarsenate, LiN(CF3SO2)2, or lithium tetrafluoroborate), and porous inorganic particle(s) (i.e. silicon dioxide, titanium dioxide, aluminum oxide, magnesium oxide, or boron oxide).

Preferred Dimensions: The support layer has a pore size of 0.001-10 microns and a thickness of 1-50 microns. The gellable polymer layer has a pore size of at most 10 microns and a thickness of 0.01-25 microns.

TECHNOLOGY FOCUS - ORGANIC CHEMISTRY - Preferred Solvent: The solvent is 1-methyl-2-pyrrolidone, acetone, ethanol, n-propanol, n-butanol, n-hexane, cyclohexanol, acetic acid, ethyl acetate, diethyl ether, dimethyl formamide, dimethyl acetamide, dioxane, tetrahydrofuran, dimethyl sulfoxide, cyclohexane, benzene, toluene, xylene, water, or derivative this solvent.

FS CPI EPI

FA AB; GI

MC CPI: A11-B05; A11-B07A; A12-E07B; A12-E09; L03-B03; L03-E01A; L03-E04G

EPI: S03-E03C; V01-B01B3; V01-B01D5; X16-A; X16-B01; X16-C; X16-F02; X16-L02

L25 ANSWER 9 OF 15 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
AN 2001-581863 [65] WPIX
CR 2002-113297 [74]
DNN N2001-433514 DNC C2001-172458
TI Electrochemical element, used as supercapacitor or ultracapacitor, comprises multistacked electrochemical cells.
DC A85 L03 S03 V01 X16
IN AHN, S H; KIM, G J; LEE, H M; LEE, J H; AHN, S; KIM, K; LEE, H; LEE, J
PA (GLDS) LG CHEM CO LTD; (GLDS) LG CHEM INVESTMENT LTD; (AHNS-I) AHN S; (KIMK-I) KIM K; (LEEH-I) LEE H; (LEEJ-I) LEE J; (GLDS) LG CHEM LTD
CYC 31
PI WO 2001059868 A1 20010816 (200165)* EN 36 H01M010-38
RW: AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
W: CN JP US
KR 2001082059 A 20010829 (200215) H01M010-38
EP 1177591 A1 20020206 (200218) EN H01M010-38
R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI TR
US 2002160257 A1 20021031 (200274) H01M002-18
CN 1363121 A 20020807 (200304) H01M010-38
TW 490875 A 20020611 (200321) H01M004-26
JP 2003523059 W 20030729 (200358) 32 H01M010-40
US 6709785 B2 20040323 (200421) H01M006-46
CN 1184712 C 20050112 (200620) H01M010-38
ADT WO 2001059868 A1 WO 2001-KR187 20010208; KR 2001082059 A KR 2001-5861 20010207; EP 1177591 A1 EP 2001-906371 20010208, WO 2001-KR187 20010208; US 2002160257 A1 WO 2001-KR187 20010208, US 2001-958268 20011005; CN 1363121 A CN 2001-800203 20010208; TW 490875 A TW 2001-103082 20010209; JP 2003523059 W JP 2001-559086 20010208, WO 2001-KR187 20010208; US 6709785 B2 WO 2001-KR187 20010208, US 2001-958268 20011005; CN 1184712 C CN 2001-800203 20010208
FDT EP 1177591 A1 Based on WO 2001059868; JP 2003523059 W Based on WO 2001059868; US 6709785 B2 Based on WO 2001059868
PRAI KR 2001-5861 20010207; KR 2000-5849 20000208
IC ICM H01M002-18; H01M004-26; H01M006-46; H01M010-38; H01M010-40
ICS H01G009-016; H01G009-058; H01G009-26; H01M002-02; H01M002-16
AB WO 200159868 A UPAB: 20020306
NOVELTY - An electrochemical element comprises multi-stacked electrochemical cells. The electrochemical cells formed by stacking full cells (17) or bicells having a cathode (7), separator layer (15), and an anode (8) sequentially as a basic unit; and a separator **film** interposed between each stacked full cell or bicell.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a method of manufacturing an electrochemical element of the above invention comprising (i) placing a first full cell or bicell at a first spot of a side of the **separator film**, placing a **second** full cell at a distance corresponding to the width plus thickness of the full cell away in longitudinal direction of the separator **film**, and placing a third full cell and next full cells at a distance corresponding to the thickness of the full cell plus thickness of the **film** incremented as the **film** is folded; (ii) laminating the placed full cells and the separator **film** of (i); and (iii) folding and winding inward the laminated full cells and the separator **film** of (ii) to the full cell adjacent next to the first full cell so that each full is folded to stack the full cells.

USE - As supercapacitors, ultracapacitors, primary or secondary **batteries**, fuel cells, sensors, electrolysis devices, or electrochemical reactors.

ADVANTAGE - The invention provides a unique but simple way of

maximizing the content of electrode active material in a prismatic **battery**. It is easy to manufacture and has a structure, which uses the space availability efficiently.

DESCRIPTION OF DRAWING(S) - The figure shows a layered structure of a full cell.

Cathode 7

Anode 8

Current collector 11, 12

Anodic material 13

Cathodic material 14

Separator layer 15

Full cells 17

Dwg.1/9

TECH WO 200159868 A1UPTX: 20011108

TECHNOLOGY FOCUS - POLYMERS - Preferred Component: The separator **film** can be micro-porous **polyethylene film**, micro-porous **polypropylene film**, or multi-layer **film**, or a polymer **film** for polymer electrolyte of polyvinylidene fluoride, **polyethylene** oxide, polyacrylonitrile, or polyvinylidene fluoride hexafluoropropylene copolymer. The polymer **film** for polymer electrolyte comprises a primary micro-porous polymer layer and secondary gelling polymer layer of polyvinylidene fluoride chlorotrifluoroethylene copolymer.

TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Component: Each cathode of the full cell is an electrode coated with a cathodic material (14) on both sides of a cathode current collector, and each of an anode is an anode electrode coated with an anodic material (13) on both sides of an anode current collector.

FS CPI EPI

FA AB; GI

MC CPI: A12-E07B; L03-B03A; L03-E04

EPI: S03-E03; V01-B01B3; V01-B01D1; X16-B01; X16-C; X16-F02; X16-F06; X16-L02

L25 ANSWER 10 OF 15 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN

AN 2001-184509 [19] WPIX

DNN N2001-131665 DNC C2001-055469

TI Microporous membrane for **multilayer** shutdown **separator**, has specified weight percentage of polymer comprising **polypropylene**, **polyethylene**, or their copolymers having specified tear resistance in the transverse direction.

DC A17 A32 A85 L03 X16

IN CALL, R W; CALLAHAN, R W; HARLESON, K J; YU, T; CALLAGHAN, R W; CARL, R W

PA (CELG-N) CELGARD INC; (SCAD-N) SCADE CORP

CYC 32

PI	EP 1081775	A2	20010307 (200119)*	EN	9	H01M002-16
	R: AL AT BE CH CY DE DK ES FI FR GB GR IE IT LI LT LU LV MC MK NL PT RO SE SI					
	CA 2314455	A1	20010228 (200120)	EN		B01D071-26
	JP 2001122998	A	20010508 (200131)		9	C08J009-00
	CN 1286502	A	20010307 (200140)			H01M002-14
	KR 2001021458	A	20010315 (200159)			H01M002-14
	SG 89340	A1	20020618 (200253)			H01M002-16
	TW 472410	A	20020111 (200281)			H01M002-16
	US 6602593	B1	20030805 (200353)			B32B003-26
	CN 1198347	C	20050420 (200641)			H01M002-14

ADT EP 1081775 A2 EP 2000-115555 20000719; CA 2314455 A1 CA 2000-2314455 20000721; JP 2001122998 A JP 2000-258371 20000829; CN 1286502 A CN 2000-126432 20000829; KR 2001021458 A KR 2000-50401 20000829; SG 89340 A1

SG 2000-4323 20000731; TW 472410 A TW 2000-114402 20000719; US 6602593 B1 US 1999-385933 19990830; CN 1198347 C CN 2000-126432 20000829
PRAI US 1999-385933 19990830
IC ICM B01D071-26; B32B003-26; C08J009-00; H01M002-14
ICS B29C055-04; B32B027-32; H01M006-50
ICA H01M002-16; H01M010-40
ICI B29K023:00, B29K105:04, B29L007:00, B29L031:34, C08L023:00
AB EP 1081775 A UPAB: 20010405
NOVELTY - A microporous membrane comprises at least 80 weight% of a polymer comprising **polypropylene**, **polyethylene**, or their copolymers having a tear resistance in the transverse direction of at least approx. 50 kgf/cm2.

DETAILED DESCRIPTION - An INDEPENDENT CLAIM is also included for a method for preparing a microporous membrane comprising (a) extruding a **film** precursor by a blown **film** method at a blow-up ratio of at least 1.5; (b) annealing the **film** precursor; and (c) stretching the resultant annealed **film** precursor to form the microporous membrane.

USE - For a **multi-layer** shutdown **separator** (claimed) for **batteries**, particularly for rechargeable **batteries**, i.e., lithium **batteries**.

ADVANTAGE - The invention (a) exhibits significantly improved split resistance characteristics, making the separator much easier to handle in both the separator production process, and during the process of making a lithium **battery** using the separator; and (b) provides **battery** separators with improved mechanical properties without requiring additional materials and complex steps.

Dwg.0/0
TECH EP 1081775 A2 UPTX: 20010405
TECHNOLOGY FOCUS - ELECTRICAL POWER AND ENERGY - Preferred Property: The microporous membrane has a Gurley value of less than approximately 100 seconds; a blow up ratio of at least approximately 1.5, preferably at least 2.0; and a ratio between the tensile strength in the transverse direction and the tensile strength in the machine direction of at least approximately 0.120. Preferred Method: The resultant annealed **film** precursor is stretched by uniaxially stretching the annealed **film** precursor in the machine direction.

TECHNOLOGY FOCUS - POLYMERS - Preferred Polymer: The polymer is a high density **polyethylene**.
FS CPI EPI
FA AB
MC CPI: A99-A; L03-E01A
EPI: X16-F02

L25 ANSWER 11 OF 15 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
AN 1999-276211 [23] WPIX
DNN N1999-206957 DNC C1999-081092
TI Method of forming electrochemical cells and electrode-separator assemblies.
DC A14 A17 A23 A85 L03 X16
IN MENON, K; RUNDLE, W T
PA (VALE-N) VALENCE TECHNOLOGY INC
CYC 1
PI US 5894656 A 19990420 (199923)* 9 H01M002-16
ADT US 5894656 A US 1997-840089 19970411
PRAI US 1997-840089 19970411
IC ICM H01M002-16
AB US 5894656 A UPAB: 19990616
NOVELTY - An electrode/separator assembly is formed by coating a polymer

matrix **film** onto a surface and applying an electrode mixture containing polymer and active material to this **film.**

DETAILED DESCRIPTION - A method of preparing an electrode/separator assembly comprises applying a layer of a mixture of polymer, solvent and plasticizer to a substrate and removing solvent to leave a polymer matrix coat. To this is applied a mixture of electrode active material, second polymer, solvent and plasticizer and the solvent removed to give an electrode/separator (20,30,31,40) bilayer. A current collector (10,50) is then attached to the electrode **film.** An INDEPENDENT CLAIM is also included for a method of forming an electrochemical cell as above in which anode and cathode are separately formed as above the steps being repeated in each case to give current collectors having two sides, each attached to electrode **films** of the electrode/**separator bilayers.**

USE - In forming electrochemical cells and **batteries**

ADVANTAGE - Adhesion of anode and cathode **films** to the solid electrolyte or separator is increased and the method is both cost-effective and suited to mass production.

DESCRIPTION OF DRAWING(S) - A schematic view of the cell assembly is shown.

Current collectors 10,50
Electrodes 20,40
Separators 30,31
Dwg.1/1

TECH US 5894656 A UPTX: 19990616
TECHNOLOGY FOCUS - INORGANIC CHEMISTRY - The anode active material is an intercalation carbon and the cathode material is a lithiated oxide of Mn, Ni or Co.

TECHNOLOGY FOCUS - POLYMERS - The polymers are copolymers of vinylidenedifluoride and hexafluoropropene with acetone solvent and the substrate is of polyester, **polyethylene, polypropylene** or paper.

FS CPI EPI
FA AB; GI
MC CPI: A04-E10B; A04-E10D; A12-E06; A12-E09; L03-E01A; L03-E01B
EPI: X16-E01G; X16-F02

L25 ANSWER 12 OF 15 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
AN 1997-542121 [50] WPIX
DNN N1997-451454 DNC C1997-173214
TI Non-aqueous electrolyte secondary **battery** - has **separator** which has **multilayer** structure of blended polymer fine pore **film** consisting of **polyethylene** and **polypropylene.**
DC A17 A85 L03 P73 X16
IN TAKAHASHI, M
PA (SAOL) SANYO ELECTRIC CO LTD
CYC 2
PI JP 09259857 A 19971003 (199750)* 9 H01M002-16
US 5856039 A 19990105 (199909) H01M002-14
ADT JP 09259857 A JP 1996-71985 19960327; US 5856039 A US 1997-824734 19970326
PRAI JP 1996-71985 19960327
IC ICM H01M002-14; H01M002-16
ICS B32B005-32; H01M010-40
AB JP 09259857 A UPAB: 19971217
The **battery** consists of a positive electrode (1) which consists of a lithium content multiple oxide. A negative electrode (2) is made of lithium ion or metal lithium. An organic electrolyte is impregnated in a separator (3). The **separator** has a **multilayered**

structure consisting of two or more blended polymer fine pore **films** made of **polyethylene** and **polypropylene**. The mixing ratio of the **polyethylene** and **polypropylene** of one polymer fine pore **film** differs from that of the other.

ADVANTAGE - Improves shutdown characteristics. Improves strength of separator.

Dwg.1/3

FS CPI EPI GMPI
FA AB; GI
MC CPI: A04-G02E4; A04-G03E; A07-A02D; A12-E06B; L03-E01A
EPI: X16-B01F1; X16-F02

L25 ANSWER 13 OF 15 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
AN 1995-384418 [50] WPIX
DNN N1995-281598 DNC C1995-166131
TI Porous, **multilayer film** for **separating** electrodes in **battery** - comprising poly olefin layers with good peel strength, uniform micropores, appropriate shut-down temperature and thermal durability.
DC A17 A85 A94 L03 P73 X16
IN AKAZAWA, T; KAWABATA, A; KURAUCHI, H
PA (UBEI) UBE IND LTD
CYC 7

PI	EP 682376	A1	19951115 (199550)*	EN	17	H01M002-16
	R: DE FR GB					
	JP 07304110	A	19951121 (199604)		10	B29D009-00
	JP 07307146	A	19951121 (199604)		10	H01M002-16
	CA 2149284	A	19951113 (199609)			B32B005-18
	US 5691047	A	19971125 (199802)		12	B32B003-26
	EP 682376	B1	20000126 (200010)	EN		
	R: DE FR GB					
	JP 3003830	B2	20000131 (200010)		9	B32B027-32
	JP 3011309	B2	20000221 (200014)		9	H01M002-16
	DE 69514711	E	20000302 (200018)			H01M002-16
	KR 242363	B1	20000201 (200118)			B32B027-32
	CA 2149284	C	20020430 (200237)	EN		B32B005-18

ADT EP 682376 A1 EP 1995-107221 19950512; JP 07304110 A JP 1994-98394 19940512; JP 07307146 A JP 1994-98395 19940512; CA 2149284 A CA 1995-2149284 19950512; US 5691047 A US 1995-440075 19950512; JP 3003830 B2 JP 1994-98394 19940512; JP 3011309 B2 JP 1994-98395 19940512; DE 69514711 E DE 1995-614711 19950512, EP 1995-107221 19950512; KR 242363 B1 KR 1995-11752 19950512; CA 2149284 C CA 1995-2149284 19950512
FDT JP 3003830 B2 Previous Publ. JP 07304110; JP 3011309 B2 Previous Publ. JP 07307146; DE 69514711 E Based on EP 682376
PRAI JP 1994-98395 19940512; JP 1994-98394 19940512
REP EP 595252; WO 9313565
IC ICM B29D009-00; B32B003-26; B32B005-18; B32B027-32
ICS B29D007-01; C08J005-18; H01M002-14; H01M010-40
ICA C08J009-00; H01M002-16
ICI B29K023:00, C08L023:02
AB EP 682376 A UPAB: 19951215
A porous multilayer **film** comprising at least three polyolefin layers. At least one of the layers is **polyethylene** and another is **polypropylene** which is in contact with the **polyethylene**. The **film** has a peel strength of at least 3 g/ 15 mm a pore volume 30 - 80% a maximum pore size of 0.02 - 2 mu, a shutdown temperature of 135 - 140deg.C. and a thermal durability to maintain the shutdown condition up to at least 280deg.C.

Also claimed is a process for making the above **film** by

combining the polyolefin layers at pressure and 120 - 140deg.C., heating the united structure to 110 - 140deg.C., stretching by 5 - 200% at -20 - 50deg.C., stretching further by 100 - 400% at 70 - 130deg.C. and finally heating to a temperature 5 - 45deg.C. higher than the previous stretching temperature

USE - The **film** is a separator **film** for separating positive and negative electrodes in a non aqueous, pref. lithium electric **battery**.

ADVANTAGE - The **film** has good peel strength, uniform micropores, an appropriate shutdown temperature, high thermal durability, a property to maintain the shutdown condition for a wide temperature range and a high elastic recovery.

Dwg.1/6

FS CPI EPI GMPI
FA AB; GI
MC CPI: A04-G02E4; A04-G03E1; A11-B02A; A11-B02C; A11-B09A2; A12-E06B; A12-S06C1; L03-E01A
EPI: X16-A02A; X16-B01F1; X16-F02

L25 ANSWER 14 OF 15 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
AN 1993-215636 [27] WPIX
DNN N1993-165744 DNC C1993-095595
TI Single layer porous **battery** separator - comprising two polymers, the permeability of the pores being blocked at above the m.pt. of the lower m.pt. polymer.
DC A18 A85 X16
IN MORI, Y; TAKAUCHI, T; YAMAZAKI, M; TAKEUCHI, T
PA (TAKA-I) TAKAUCHI T; (GRAC) GRACE & CO-CONN W R; (CELG-N) CELGARD INC
CYC 10

PI	EP 550262	A1	19930707 (199327)*	EN	19	H01M002-14
	R: DE FR GB IT					
	CA 2085380	A	19930628 (199338)			H01M002-16
	JP 05247253	A	19930924 (199343)		26	C08J009-26
	ZA 9209949	A	19930929 (199344)		27	H01M000-00
	JP 05258740	A	19931008 (199345)		13	H01M002-16
	TW 222011	A	19940401 (199419)			C08J005-22
	US 5453333	A	19950926 (199544)		15	H01M002-16
	EP 550262	B1	19970402 (199718)	EN	20	H01M002-14
	R: DE FR GB IT					
	DE 69218750	E	19970507 (199724)			H01M002-14
	KR 292978	B	20010615 (200225)			H01M002-14
	CA 2085380	C	20051129 (200581)	EN		H01M002-16

ADT EP 550262 A1 EP 1992-311791 19921224; CA 2085380 A CA 1992-2085380 19921215; JP 05247253 A JP 1992-268012 19920910; ZA 9209949 A ZA 1992-9949 19921222; JP 05258740 A JP 1992-268013 19920910; TW 222011 A TW 1993-100048 19930106; US 5453333 A US 1992-992181 19921217; EP 550262 B1 EP 1992-311791 19921224; DE 69218750 E DE 1992-618750 19921224, EP 1992-311791 19921224; KR 292978 B KR 1992-25660 19921224; CA 2085380 C CA 1992-2085380 19921215
FDT DE 69218750 E Based on EP 550262; KR 292978 B Previous Publ. KR 93015166
PRAI JP 1991-358890 19911227; JP 1991-358891 19911227; JP 1992-268012 19920911; JP 1992-268013 19920911
REP EP 391694; US 4741979
IC ICM C08J005-22; C08J009-26; H01M002-14; H01M002-16
ICS B01D000-00; H01M006-14; H01M010-40
AB EP 550262 A UPAB: 19931118

Battery separator comprises single layer porous membrane composed of uniform mixture of first polymer and second polymer with m.pt. at least 10 deg. C lower than the first, the second polymer being present on the pore walls and being capable of blocking the pores, so reducing the

permeability of the membrane, on elevation to at least the m.pt. of the **second** polymer. **Separator** is claimed in which the membrane comprises the first polymer and has pore walls coated with the second polymer to provide the same props. **Battery** where the improvement of using such separators is also claimed.

The first polymer is pref. of m.pt. at least 130 deg. C, and is especially **polypropylene** of Mw 30000-800000; the second pref. has m.pt. 80-120 deg. C and is especially **polyethylene** of m.pt. 95-120 deg. C; alternative second polymers are from LDPE, LLDPE, and/or EVA-, ethylene-butadiene-, ethylene-(alkyl)acrylate-, and/or ethylene-(alkyl)acrylic acid copolymers.

USE/ADVANTAGE - In rechargeable Li sec. **batteries**, specifically with anodes of Li metal, Li salt in solid carrier, or Li alloys, the separators provide protection against fire and explosion on overheating caused by a charging malfunction or short-circuiting; the single layer membrane is thinner than **multi-layer separators**, providing increased permeability, while having high mechanical strength which is retained on becoming non-porous.

Dwg.2/6

FS CPI EPI
FA AB; GI
MC CPI: A12-E13; A12-L03A; A12-L04; B04-B04D5; B05-C04; B05-C08; B11-C07B2; B12-K04A; E31-D02; E31-N05C; J04-C04
EPI: X16-B01F1; X16-F02

L25 ANSWER 15 OF 15 WPIX COPYRIGHT 2006 THE THOMSON CORP on STN
AN 1982-06600E [04] WPIX
TI Silver oxide **battery** with internal short-circuit prevented - comprises anode and cathode separated by two separators, one having high and one low permeability w.r.t.. silver ions.
DC A85 L03
PA (RAYN) TOSHIBA BATTERY CO LTD
CYC 1
PI JP 56160765 A 19811210 (198204)* 4
PRAI JP 1980-65516 19800516
IC H01M002-26
AB JP 56160765 A UPAB: 19930915

Silver oxide **battery** comprises (1) anodic mixed. agent, (2) cathodic agent corresp. to the anodic mixed agent and (3) separator between (1) and (2). First separator has higher permeability to Ag ion and lower reduction amount and **2nd separator** has a lower permeability to Ag ion and higher reduction amount separators are piled or laminated.

In an example, the 1st separator was obtd. from acrylic or methacrylic acid graft-polymerised **polyethylene film**, where the **polyethylene film** was of high, middle or low density, the thickness and graft ratio were changeable. The **2nd separator** was obtd. from cellulose **film**, polyvinylalcohol **film** or **polypropylene film.**

Internal short-circuit due to separator deterioration is prevented.

FS CPI
FA AB
MC CPI: A12-E06; L03-E01A

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FILE COVERS 1907 - 6 Jul 2006 VOL 145 ISS 2
FILE LAST UPDATED: 5 Jul 2006 (20060705/ED)

New CAS Information Use Policies, enter HELP USAGETERMS for details.

This file contains CAS Registry Numbers for easy and accurate
substance identification.

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L4             1 SEA FILE=REGISTRY ABB=ON  POLYETHYLENE/CN
L6        206786 SEA FILE=HCAPLUS ABB=ON  L3 OR PP OR POLYPROPYLENE
L7        383954 SEA FILE=HCAPLUS ABB=ON  L4 OR PE OR POLYETHYLENE
L8         66002 SEA FILE=HCAPLUS ABB=ON  L6 AND L7
L21         9212 SEA FILE=HCAPLUS ABB=ON  SEPARAT?(3A)(MULTILAYER? OR BILAYER?
                 OR TRILAYER? OR 2ND OR SECOND OR TRI(W)LAYER? OR MULTI(W)LAYER?
                  OR BI(W)LAYER? OR STACK?(3A)?LAYER?)
L22           94 SEA FILE=HCAPLUS ABB=ON  L21 AND L8
L23           53 SEA FILE=HCAPLUS ABB=ON  L22 AND BATTER?
L24           21 SEA FILE=HCAPLUS ABB=ON  L23 AND FILM?


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FILE COVERS 1970 TO DATE.

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L4             1 SEA FILE=REGISTRY ABB=ON  POLYETHYLENE/CN
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L8         66002 SEA FILE=HCAPLUS ABB=ON  L6 AND L7
L21         9212 SEA FILE=HCAPLUS ABB=ON  SEPARAT?(3A)(MULTILAYER? OR BILAYER?
                 OR TRILAYER? OR 2ND OR SECOND OR TRI(W)LAYER? OR MULTI(W)LAYER?
                  OR BI(W)LAYER? OR STACK?(3A)?LAYER?)
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L23           53 SEA FILE=HCAPLUS ABB=ON  L22 AND BATTER?
L26            0 SEA FILE=COMPENDEX ABB=ON  L23 AND FILM?
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=> file jicst
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L4             1 SEA FILE=REGISTRY ABB=ON  POLYETHYLENE/CN
L6        206786 SEA FILE=HCAPLUS ABB=ON  L3 OR PP OR POLYPROPYLENE
L7        383954 SEA FILE=HCAPLUS ABB=ON  L4 OR PE OR POLYETHYLENE
L8         66002 SEA FILE=HCAPLUS ABB=ON  L6 AND L7
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L27            0 SEA FILE=JICST-EPLUS ABB=ON  L23 AND FILM?


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FILE COVERS APRIL 1973 TO DECEMBER 22, 2005

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L7        383954 SEA FILE=HCAPLUS ABB=ON  L4 OR PE OR POLYETHYLENE
L8         66002 SEA FILE=HCAPLUS ABB=ON  L6 AND L7
L21         9212 SEA FILE=HCAPLUS ABB=ON  SEPARAT?(3A)(MULTILAYER? OR BILAYER?
                 OR TRILAYER? OR 2ND OR SECOND OR TRI(W)LAYER? OR MULTI(W)LAYER?
                  OR BI(W)LAYER? OR STACK?(3A)?LAYER?)
L22           94 SEA FILE=HCAPLUS ABB=ON  L21 AND L8
L23           53 SEA FILE=HCAPLUS ABB=ON  L22 AND BATTER?
L28            2 SEA FILE=JAPIO ABB=ON  L23 AND FILM?


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FILE COVERS 1969 TO DATE.

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L3             1 SEA FILE=REGISTRY ABB=ON  POLYPROPYLENE/CN
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                 OR TRILAYER? OR 2ND OR SECOND OR TRI(W)LAYER? OR MULTI(W)LAYER?
                  OR BI(W)LAYER? OR STACK?(3A)?LAYER?)
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=> dup rem l24 l28
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PROCESSING COMPLETED FOR L24
PROCESSING COMPLETED FOR L28
L30           23 DUP REM L24 L28 (0 DUPLICATES REMOVED)

=> d l30 all 1-23

L30  ANSWER 1 OF 23  HCAPLUS  COPYRIGHT 2006 ACS on STN
AN   2005:451706  HCAPLUS
DN   143:10533
ED   Entered STN:  27 May 2005
TI   Secondary nonaqueous electrolyte battery
IN   Takeuchi, Takashi; Nagasaki, Akira; Yoshizawa, Hiroshi
PA   Matsushita Electric Industrial Co., Ltd., Japan
SO   PCT Int. Appl., 57 pp.
     CODEN: PIXXD2
DT   Patent
LA   Japanese
IC   ICM  H01M004-48
     ICS  H01M004-58; H01M004-02; H01M010-40; H01M002-16
CC   52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
FAN.CNT 1
     PATENT NO.          KIND   DATE        APPLICATION NO.         DATE
     --------------      ----   --------    --------------------    --------
PI   WO 2005048380        A1    20050526    WO 2004-JP16653         20041110
         W:  AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH,
             CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD,
             GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC,
             LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI,
             NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY,
             TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW
         RW: BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW, AM,
             AZ, BY, KG, KZ, MD, RU, TJ, TM, AT, BE, BG, CH, CY, CZ, DE, DK,
             EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LU, MC, NL, PL, PT, RO,
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SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PRAI JP 2003-387160 A 20031117

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 2005048380	ICM	H01M004-48
	ICS	H01M004-58; H01M004-02; H01M010-40; H01M002-16
	IPCI	H01M0004-48 [ICM,7]; H01M0004-58 [ICS,7]; H01M0004-02 [ICS,7]; H01M0010-40 [ICS,7]; H01M0010-36 [ICS,7,C*]; H01M0002-16 [ICS,7]
	IPCR	H01M0002-16 [I,A]; H01M0002-16 [I,C*]; H01M0004-02 [I,A]; H01M0004-02 [I,C*]; H01M0004-48 [I,A]; H01M0004-48 [I,C*]; H01M0004-58 [I,A]; H01M0004-58 [I,C*]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]

AB The **battery** has a separator between a cathode and an anode and an electrolyte solution; where the cathode contains a cathode active mass, comprising a Li composite oxide: LixMe1-y-zMyLzO2 [Me = transition metal element(s) excluding Ti, Mn, Y, and Zr; M = Mg, Ti, Mn, and/or Zn; L = Al, Ca, Ba, Sr, Y, and/or Zr; x = 1-1.05; y = 0.005-0.1 (but y = 0.005-0.5 when M is Mn); and z = 0-0.05]; and the **separator** consists of a **stack** of single-**layer** **films**, having a fine porous structure; where the single-layer **film** facing the cathode is made of **polypropylene.**

ST secondary **battery** cathode lithium composite oxide; **battery separator** single **layer film** **stack polyethylene**

IT **Battery** cathodes
Secondary **battery** separators
(cathodes containing lithium composite oxides and separators containing **polypropylene** for secondary lithium **batteries**)

IT Secondary **batteries**
(lithium; cathodes containing lithium composite oxides and separators containing **polypropylene** for secondary lithium **batteries**)

IT 7782-42-5, Graphite, uses **9002-88-4, Polyethylene** **9003-07-0, Polypropylene** 144419-56-7, Cobalt lithium magnesium oxide (Co0.95LiMg0.05O2) 345664-05-3, Aluminum cobalt lithium oxide (Al0.01Co0.99LiO2) 372491-81-1, Aluminum cobalt lithium magnesium oxide (Al0.1Co0.89LiMg0.01O2) 372491-82-2, Aluminum cobalt lithium magnesium oxide (Al0.01Co0.96LiMg0.03O2) 372491-83-3, Aluminum cobalt lithium magnesium oxide (Al0.01Co0.94LiMg0.05O2) 372492-00-7, Aluminum cobalt lithium magnesium oxide (Al0.01Co0.98LiMg0.01O2) 478814-69-6, Aluminum cobalt lithium magnesium oxide (Al0.05Co0.9LiMg0.05O2) 489431-33-6, Aluminum cobalt lithium oxide (Al0.01Co0.98LiO2) 721448-53-9, Cobalt lithium magnesium oxide (Co0.94LiMg0.05O2) 852333-25-6, Aluminum cobalt lithium magnesium oxide (Al0.1Co0.85LiMg0.05O2) 852333-26-7, Aluminum cobalt lithium magnesium oxide (Al0.2Co0.79LiMg0.01O2) 852333-27-8, Cobalt lithium magnesium strontium oxide (Co0.94LiMg0.05Sr0.01O2) 852333-28-9, Cobalt lithium magnesium zirconium oxide (Co0.94LiMg0.05Zr0.01O2) 852333-29-0, Calcium cobalt lithium magnesium oxide (Ca0.01Co0.94LiMg0.05O2) 852333-31-4, Barium cobalt lithium magnesium oxide (Ba0.01Co0.94LiMg0.05O2) 852333-33-6, Cobalt lithium magnesium yttrium oxide (Co0.94LiMg0.05Y0.01O2) 852333-35-8, Aluminum cobalt lithium titanium oxide (Al0.01Co0.94LiTi0.05O2) 852333-37-0, Aluminum cobalt lithium zinc oxide (Al0.01Co0.94LiZn0.05O2) 852333-38-1, Aluminum cobalt lithium manganese oxide (Al0.01Co0.94LiMn0.05O2) 852333-39-2, Aluminum cobalt lithium magnesium oxide (Al0.03Co0.92LiMg0.05O2) 852333-41-6, Aluminum cobalt lithium magnesium oxide (Al0.01Co0.91LiMg0.08O2) 852333-42-7,

Aluminum cobalt lithium magnesium oxide (Al0.01Co0.84LiMg0.15O2)
852333-43-8, Aluminum cobalt lithium magnesium oxide
(Al0.05Co0.89LiMg0.06O2)
RL: DEV (Device component use); USES (Uses)
(cathodes containing lithium composite oxides and separators containing **polypropylene** for secondary lithium **batteries**)

RE.CNT 26 THERE ARE 26 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Asahi Kasei Corp; JP 2002321323 A 2002 HCAPLUS
(2) Matsushita Electric Industrial Co Ltd; JP 2003197172 A 2003 HCAPLUS
(3) Matsushita Electric Industrial Co Ltd; WO 200356644 A1 2003
(4) Matsushita Electric Industrial Co Ltd; KR 200462441 A 2003
(5) Nitto Denko Corp; JP 11-21371 A 1999 HCAPLUS
(6) Samsung Sdi Kabushiki Kaisha; US 2003138699 A1 2003
(7) Samsung Sdi Kabushiki Kaisha; JP 2003217572 A 2003 HCAPLUS
(8) Samsung Sdi Kabushiki Kaisha; KR 200363930 A 2003
(9) Sanyo Electric Co Ltd; JP 09-259857 A 1997 HCAPLUS
(10) Sanyo Electric Co Ltd; US 5856039 A 1997 HCAPLUS
(11) Seimi Chemical Co Ltd; JP 2002145623 A 2002 HCAPLUS
(12) Sony Corp; EP 1347524 A1 2002 HCAPLUS
(13) Sony Corp; JP 2002203553 A 2002 HCAPLUS
(14) Sony Corp; JP 2002246000 A 2002 HCAPLUS
(15) Sony Corp; WO 200254512 A1 2002
(16) Sony Corp; WO 200265561 A1 2002
(17) Sony Corp; US 2003134200 A1 2002 HCAPLUS
(18) Sony Corp; US 2004115523 A1 2002 HCAPLUS
(19) Ube Industries Ltd; JP 07-307146 A 1995 HCAPLUS
(20) Ube Industries Ltd; KR 242363 B1 1995
(21) Ube Industries Ltd; US 5691047 A 1995 HCAPLUS
(22) Ube Industries Ltd; EP 682376 A1 1995 HCAPLUS
(23) Yuasa Corp; EP 1391950 A1 2002 HCAPLUS
(24) Yuasa Corp; JP 2002584408 A 2002
(25) Yuasa Corp; WO 200286993 A1 2002
(26) Yugen Kaisha Kee; JP 200237631 A 2002

L30 ANSWER 2 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2005:116191 HCAPLUS
DN 142:201592
ED Entered STN: 10 Feb 2005
TI Method of fabrication of **battery** separator
IN Call, Ronald W.
PA Celgard Inc., USA
SO Eur. Pat. Appl., 6 pp.
CODEN: EPXXDW
DT Patent
LA English
IC ICM H01M002-16
ICS H01M002-18
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI EP 1505671	A2	20050209	EP 2004-18207	20040731
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO, MK, CY, AL, TR, BG, CZ, EE, HU, PL, SK, HR				
US 2005031943	A1	20050210	US 2003-636115	20030807
CA 2472281	AA	20050207	CA 2004-2472281	20040625
CN 1581534	A	20050216	CN 2004-10058886	20040803
JP 2005056851	A2	20050303	JP 2004-231815	20040809

PRAI US 2003-636115 A 20030807

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 1505671	ICM	H01M002-16
	ICS	H01M002-18
	IPCI	H01M0002-16 [ICM,7]; H01M0002-18 [ICS,7]; H01M0002-14 [ICS,7,C*]
	IPCR	B29C0047-00 [I,A]; B29C0047-00 [I,C*]; B29D0007-00 [I,C*]; B29D0007-01 [I,A]; B32B0027-32 [I,A]; B32B0027-32 [I,C*]; H01M0002-14 [I,A]; H01M0002-14 [I,C*]; H01M0002-16 [I,A]; H01M0002-16 [I,C*]; H01M0002-18 [I,A]
	ECLA	H01M002/16C3
US 2005031943	IPCI	H01M0002-18 [ICM,7]; H01M0002-14 [ICM,7,C*]; B29C0047-00 [ICS,7]
	IPCR	B29C0047-00 [I,A]; B29C0047-00 [I,C*]; B29D0007-00 [I,C*]; B29D0007-01 [I,A]; B32B0027-32 [I,A]; B32B0027-32 [I,C*]; H01M0002-14 [I,A]; H01M0002-14 [I,C*]; H01M0002-16 [I,A]; H01M0002-16 [I,C*]; H01M0002-18 [I,A]
	NCL	429/144.000
	ECLA	H01M002/16C3
CA 2472281	IPCI	H01M0002-14 [ICM,7]
	IPCR	B29C0047-00 [I,A]; B29C0047-00 [I,C*]; B29D0007-00 [I,C*]; B29D0007-01 [I,A]; B32B0027-32 [I,A]; B32B0027-32 [I,C*]; H01M0002-14 [I,A]; H01M0002-14 [I,C*]; H01M0002-16 [I,A]; H01M0002-16 [I,C*]; H01M0002-18 [I,A]
	ECLA	H01M002/16C3
CN 1581534	IPCI	H01M0002-14 [ICM,7]; H01M0002-16 [ICS,7]; B32B0027-32 [ICS,7]; B29D0007-01 [ICS,7]; B29D0007-00 [ICS,7,C*]; B29D0009-00 [ICS,7]
	IPCR	B29C0047-00 [I,A]; B29C0047-00 [I,C*]; B29D0007-00 [I,C*]; B29D0007-01 [I,A]; B32B0027-32 [I,A]; B32B0027-32 [I,C*]; H01M0002-14 [I,A]; H01M0002-14 [I,C*]; H01M0002-16 [I,A]; H01M0002-16 [I,C*]; H01M0002-18 [I,A]
	ECLA	H01M002/16C3
JP 2005056851	IPCI	H01M0002-16 [ICM,7]
	IPCR	B29C0047-00 [I,A]; B29C0047-00 [I,C*]; B29D0007-00 [I,C*]; B29D0007-01 [I,A]; B32B0027-32 [I,A]; B32B0027-32 [I,C*]; H01M0002-14 [I,A]; H01M0002-14 [I,C*]; H01M0002-16 [I,A]; H01M0002-16 [I,C*]; H01M0002-18 [I,A]
	FTERM	5H021/BB01; 5H021/BB02; 5H021/BB11; 5H021/CC04; 5H021/EE04; 5H021/HH00; 5H021/HH03; 5H021/HH06

AB A **battery separator** comprises a **multi-layered film**, individual layers of the **film** having been bonded together by heat and pressure, having a peel strength of greater than or equal to 40 g/in. and a thickness of ≤25 μm. A method for making a **battery** separator comprises the steps of: extruding and winding up a first precursor **film**, extruding and winding up a second precursor **film**, unwinding the first and second precursor **films**, stacking up the first and second precursor **films** to form a single stacked precursor, laminating the single stacked precursor **film**, winding up the laminated single stacked precursor **film**, stacking up a plurality of laminated single stacked precursor **films**, and making microporous the stacked plurality of laminated single stacked precursor **films**

ST **battery** separator fabrication method
IT Secondary **batteries**
(lithium; method of fabrication of **battery** separator)
IT Secondary **battery** separators
(method of fabrication of **battery** separator)
IT **9002-88-4, Polyethylene 9003-07-0, Polypropylene**
RL: DEV (Device component use); USES (Uses)
(method of fabrication of **battery** separator)

L30 ANSWER 3 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2004:739825 HCAPLUS
DN 141:228166
ED Entered STN: 10 Sep 2004
TI Composite polymer electrolytes for a rechargeable lithium **battery**
IN Dasgupta, Sankar; Bhola, Rakesh; Jacobs, James K.
PA Electrovaya Inc., Can.
SO U.S. Pat. Appl. Publ., 16 pp., Cont.-in-part of U.S. Ser No. 104,277.
CODEN: USXXCO
DT Patent
LA English
IC ICM H01M010-40
ICS H01M002-16
INCL 429309000; 429144000; 429307000; 429317000; 429316000
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2004175626	A1	20040909	US 2004-799759	20040315
	US 2001038948	A1	20011108	US 1998-104277	19980625
	US 6753114	B2	20040622		
PRAI	US 1998-82341P	P	19980420		
	US 1998-104277	A2	19980625		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2004175626	ICM	H01M010-40
	ICS	H01M002-16
	INCL	429309000; 429144000; 429307000; 429317000; 429316000
	IPCI	H01M0010-40 [ICM,7]; H01M0010-36 [ICM,7,C*]; H01M0002-16 [ICS,7]
	IPCR	H01M0002-16 [I,A]; H01M0002-16 [I,C*]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]
	NCL	429/309.000
	ECLA	H01M002/16C3; H01M010/40; H01M010/40B
US 2001038948	IPCI	H01M0010-40 [ICM,7]; H01M0010-36 [ICM,7,C*]
	IPCR	H01M0002-16 [I,A]; H01M0002-16 [I,C*]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]
	NCL	429/304.000
	ECLA	H01M002/16C3; H01M010/40; H01M010/40B

AB The composite electrolyte for use in a thin plate rechargeable lithium **battery** comprises a porous or microporous inert, **multi-layered** polymer **separator** laminate which carries an adherent second polymer coating containing a dissociable lithium compound, and the **multi-layered separator** having adherent solid **second** polymer layer, is impregnated with an organic liquid containing another lithium salt. The porous or micro-porous separator laminate is made of multiple polymer layers, at least one of the member

layers having melting temperature at least 20° below the melting temperature of the other polymer member layers. The composite porous electrolyte is inserted between the electrodes of a rechargeable lithium **battery**. In another embodiment the porous polymer separator sheet has an adherent, dissociable lithium compound containing, solid second polymer layer on each of its major faces.

ST lithium **battery** composite polymer electrolyte

IT **Battery** electrolytes
Coating process
Composites
Electrophoresis
Vapor deposition process
(composite polymer electrolytes for rechargeable lithium **battery**)

IT Fluoropolymers, uses
Polyoxyalkylenes, uses
RL: DEV (Device component use); USES (Uses)
(composite polymer electrolytes for rechargeable lithium **battery**)

IT Secondary **batteries**
(lithium; composite polymer electrolytes for rechargeable lithium **battery**)

IT Polyolefins
RL: DEV (Device component use); USES (Uses)
(long-chain; composite polymer electrolytes for rechargeable lithium **battery**)

IT 96-49-1, Ethylene carbonate 105-58-8, Diethyl carbonate 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 623-53-0, Methyl ethyl carbonate 7791-03-9, Lithium perchlorate 9002-84-0, PTFE **9002-88-4**, **Polyethylene** 14283-07-9, Lithium tetrafluoroborate 21324-40-3, Lithium hexafluorophosphate 24937-79-9, Pvdf 25322-68-3, Peo 29935-35-1 33454-82-9, Lithium triflate
RL: DEV (Device component use); USES (Uses)
(composite polymer electrolytes for rechargeable lithium **battery**)

IT **9003-07-0**, Celgard 2300
RL: DEV (Device component use); USES (Uses)
(**film**; composite polymer electrolytes for rechargeable lithium **battery**)

L30 ANSWER 4 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2003:570318 HCAPLUS
DN 139:103811
ED Entered STN: 25 Jul 2003
TI Continuous methods of making microporous **battery** separators
IN Yu, Wei-Ching
PA USA
SO U.S. Pat. Appl. Publ., 8 pp.
CODEN: USXXCO
DT Patent
LA English
IC ICM B32B031-00
INCL 156229000; X15-624.411; X15-624.412; X15-630.82
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2003136500	A1	20030724	US 2002-41348	20020108

US 6878226 B2 20050412
PRAI US 2002-41348 20020108
CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 2003136500	ICM	B32B031-00
	INCL	156229000; X15-624.411; X15-624.412; X15-630.82
	IPCI	B32B0031-00 [ICM,7]
	IPCR	B32B0027-32 [I,A]; B32B0027-32 [I,C*]
	NCL	156/229.000
	ECLA	B32B027/32; B32B038/00D

AB A continuous method of making dry-stretch microporous membrane **battery** separators from **polypropylene** (**PP**) or **polyethylene** (**PE**) or both benefits to the manufacturers in the production efficiency. The precursor-**film** extrusion in this invention is accomplished by multiple small **film**-extrusion lines at a compatible line speed with the followed oven processes (annealing and stretching). The overall production process starts continuously from **film** extrusion to annealing and to stretching. The benefits of the inventive continuous process includes a higher product yield, more effective oven-time usage, no need to handle and manage the intermediate products, less need in labor and machine maintenance, and potentially more stable product quality. The dry-stretch membrane separators made with this inventive continuous method include (1) single-ply **PP** or **PE** separators having a thickness ranging from 0.2 mil to 2.0 mil; (2) **PP/PE/PP trilayer** microporous membrane **separators** having a thickness ranging from 0.6 mil to 4.0 mil. The **PP/PE/PP** trilayer can be accomplished in the early extrusion via either co-extrusion or extruding sep. and then interposing **PE** layer between two **PP** layers, continuously, right before annealing/bonding and stretching process.

ST **battery** microporous separator fabrication extrusion

IT Primary **battery** separators
(Continuous methods of making microporous **battery** separators)

IT Polyolefins
RL: DEV (Device component use); USES (Uses)
(dry stretched; Continuous methods of making microporous **battery** separators)

IT Extrusion of plastics and rubbers
(**film**; Continuous methods of making microporous **battery** separators)

IT 532-32-1, Sodium benzoate
RL: MOA (Modifier or additive use); USES (Uses)
(Continuous methods of making microporous **battery** separators)

IT **9002-88-4, Polyethylene 9003-07-0, Polypropylene**
RL: DEV (Device component use); USES (Uses)
(dry stretched; Continuous methods of making microporous **battery** separators)

RE.CNT 20 THERE ARE 20 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

(1) Bierenbaum; US 3843761 A 1974 HCAPLUS
(2) Bierenbdum; US 3426754 A 1969
(3) Brazinsky; US 4138459 A 1979
(4) Druin; US 3679538 A 1972 HCAPLUS
(5) Druin; US 3801404 A 1974 HCAPLUS
(6) Isaacson; US 3558764 A 1971
(7) Kamaei; US 4994335 A 1991 HCAPLUS
(8) Kamei; US 5173235 A 1992

(9) Loft; US 3932682 A 1976
(10) Mrozinski; US 4726989 A 1988
(11) Okamura; US 4384023 A 1983 HCAPLUS
(12) Shipman; US 4539256 A 1985
(13) Yu; US 5565281 A 1996
(14) Yu; US 5667911 A 1997
(15) Yu; US 5691077 A 1997
(16) Yu; US 5952120 A 1999 HCAPLUS
(17) Yu; US 6080507 A 2000 HCAPLUS
(18) Yu; US 6132654 A 2000 HCAPLUS
(19) Zimmerman; US 3679540 A 1972 HCAPLUS
(20) Zimmerman; US 3801692 A 1974

L30 ANSWER 5 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2001:726671 HCAPLUS
DN 135:275351
ED Entered STN: 05 Oct 2001
TI Secondary nonaqueous **battery** using **multilayer** porous **separator**
IN Murai, Tetsuya; Watari, Yukihiro
PA Japan Storage Battery Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM H01M002-16
ICS H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2001273880	A2	20011005	JP 2000-86712	20000327
PRAI JP 2000-86712		20000327		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2001273880	ICM	H01M002-16
	ICS	H01M010-40
	IPCI	H01M0002-16 [ICM,7]; H01M0010-40 [ICS,7]; H01M0010-36 [ICS,7,C*]
	IPCR	H01M0002-16 [I,A]; H01M0002-16 [I,C*]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]

AB The **battery** has the separator between electrodes, wherein one layer of the separator facing the cathode is made of **polypropylene**. **Polyethylene** may be used in the other layer of the separator. The **polypropylene** layer prevents gas generation from the separator at high temperature or high voltage.
ST **polypropylene multilayer** porous **separator** nonaq **battery**; **polyethylene multilayer** porous **separator** nonaq **battery**
IT Laminated plastic **films**
Secondary **battery separators**
(nonaq. **battery** using **multilayer** porous **separator** with **polypropylene** layer on cathode side for gas generation prevention)
IT **9002-88-4**, **Polyethylene**
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(anode side layer; nonaq. **battery** using **multilayer** porous **separator** with **polypropylene** layer on

cathode side for gas generation prevention)

IT **9003-07-0, Polypropylene**
RL: DEV (Device component use); PRP (Properties); USES (Uses)
(nonaq. **battery** using **multilayer** porous **separator** with **polypropylene** layer on cathode side for gas generation prevention)

L30 ANSWER 6 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2001:228414 HCAPLUS
DN 134:240168
ED Entered STN: 30 Mar 2001
TI Metal hydroxide-hydrogen secondary **batteries** having excellent cycle characteristics and long service life
IN Yuasa, Koji; Hattori, Yohei; Yoshii, Fumihiko; Umitani, Hideo
PA Matsushita Electric Industrial Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 10 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM H01M002-16
ICS H01M002-16; D01F006-04; H01M010-30; C08J009-00
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 40
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 2001084982	A2	20010330	JP 1999-262969	19990917
PRAI JP 1999-262969		19990917		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2001084982	ICM	H01M002-16
	ICS	H01M002-16; D01F006-04; H01M010-30; C08J009-00
	IPCI	H01M0002-16 [ICM,7]; H01M0002-16 [ICS,7]; D01F0006-04 [ICS,7]; H01M0010-30 [ICS,7]; C08J0009-00 [ICS,7]
	IPCR	C08J0009-00 [N,A]; C08J0009-00 [N,C*]; D01F0006-04 [I,A]; D01F0006-04 [I,C*]; H01M0002-16 [I,A]; H01M0002-16 [I,C*]; H01M0010-24 [I,C*]; H01M0010-30 [I,A]

AB The separators of the title **batteries** are ≥3-layered hydrophilized laminates or hydrophilized multilayer structures of ≥1 polyolefin (non)woven textile(s) laminated with ≥1 polyolefin porous **film**(s) having smaller average pore diameter than the textile(s).

ST nickel hydrogen secondary **battery** polyolefin separator; textile polyolefin laminate secondary **battery** separator; porous polyolefin **film** laminate **battery** separator

IT Polyolefin fibers
RL: DEV (Device component use); USES (Uses)
(ethylene, sulfonated, bicomponent fibers with **polypropylene**, fabric; metal hydroxide-hydrogen secondary **batteries** with **multilayered separators** comprising of polyolefin textiles and polyolefin porous **films**)

IT Porous materials
(**films**, polyolefin; metal hydroxide-hydrogen secondary **batteries** with **multilayered separators** comprising of polyolefin textiles and polyolefin porous **films**)

IT Secondary **battery** separators
(metal hydroxide-hydrogen secondary **batteries** with

multilayered separators comprising of polyolefin textiles and polyolefin porous **films**)

IT Laminated plastics, uses
RL: DEV (Device component use); USES (Uses)
(metal hydroxide-hydrogen secondary **batteries** with **multilayered separators** comprising of polyolefin textiles and polyolefin porous **films**)

IT Textiles
(polyolefin; metal hydroxide-hydrogen secondary **batteries** with **multilayered separators** comprising of polyolefin textiles and polyolefin porous **films**)

IT **Films**
(porous, polyolefin; metal hydroxide-hydrogen secondary **batteries** with **multilayered separators** comprising of polyolefin textiles and polyolefin porous **films**)

IT Polypropene fibers, uses
RL: DEV (Device component use); USES (Uses)
(sulfonated, bicomponent fibers with **polyethylene**, fabric; metal hydroxide-hydrogen secondary **batteries** with **multilayered separators** comprising of polyolefin textiles and polyolefin porous **films**)

IT Polyolefins
RL: DEV (Device component use); USES (Uses)
(textiles and porous **films**; metal hydroxide-hydrogen secondary **batteries** with **multilayered separators** comprising of polyolefin textiles and polyolefin porous **films**)

IT 25085-53-4D, Isotactic **polypropylene**, sulfonated
RL: DEV (Device component use); USES (Uses)
(bicomponent fibers with **polyethylene**, fabric; metal hydroxide-hydrogen secondary **batteries** with **multilayered separators** comprising of polyolefin textiles and polyolefin porous **films**)

IT **9002-88-4D, Polyethylene**, sulfonated
RL: DEV (Device component use); USES (Uses)
(fabric and porous **films**; metal hydroxide-hydrogen secondary **batteries** with **multilayered separators** comprising of polyolefin textiles and polyolefin porous **films**)

L30 ANSWER 7 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2001:96919 HCAPLUS
DN 134:134115
ED Entered STN: 08 Feb 2001
TI Fabrication of multilayer **battery** cell
IN Horie, Hideaki; Abe, Takaaki; Kawai, Mikio; Ohsawa, Yasuhiko; Tanjou, Yuuji; Shimamura, Osamu; Fukuzawa, Tatsuhiro
PA Nissan Motor Company, Limited, Japan
SO Eur. Pat. Appl., 15 pp.
CODEN: EPXXDW
DT Patent
LA English
IC ICM H01M010-40
ICS H01M010-04; H01M002-16
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE

PI EP 1075037 A1 20010207 EP 2000-116805 20000803
R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO
JP 2001052753 A2 20010223 JP 1999-220907 19990804
US 6489053 B1 20021203 US 2000-631788 20000803
PRAI JP 1999-220907 A 19990804

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 1075037	ICM	H01M010-40
	ICS	H01M010-04; H01M002-16
	IPCI	H01M0010-40 [ICM,6]; H01M0010-36 [ICM,6,C*]; H01M0010-04 [ICS,6]; H01M0002-16 [ICS,6]
	IPCR	H01M0002-16 [N,A]; H01M0002-16 [N,C*]; H01M0006-40 [N,A]; H01M0006-40 [N,C*]; H01M0010-04 [I,A]; H01M0010-04 [I,C*]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]
	ECLA	H01M010/04F; H01M010/40L
JP 2001052753	IPCI	H01M0010-40 [ICM,7]; H01M0010-36 [ICM,7,C*]; H01M0004-04 [ICS,7]
	IPCR	H01M0002-16 [N,A]; H01M0002-16 [N,C*]; H01M0006-40 [N,A]; H01M0006-40 [N,C*]; H01M0010-04 [I,A]; H01M0010-04 [I,C*]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]
US 6489053	IPCI	H01M0002-00 [ICM,7]; H01M0006-12 [ICS,7]; H01M0006-04 [ICS,7,C*]
	NCL	429/162.000; 429/163.000; 429/233.000; 429/234.000; 429/245.000
	ECLA	H01M010/04F; H01M010/40L

AB A multilayer **battery** cell comprises an ion-conductive separator **film.** A pos. electrode layer is disposed on one surface of the separator **film.** A neg. electrode layer is disposed on the other surface of the separator **film.** A first conductive layer is disposed on the pos. electrode layer and elec. connected to the same. A second conductive layer is disposed on the neg. electrode layer and elec. connected to the same. The pos. and neg. electrode layers and the first and second conductive layers are each produced by employing a spraying process.

ST **battery** multilayer cell

IT Secondary **battery separators**
Spraying
(fabrication of **multilayer battery** cell)

IT Polyamic acids
RL: RCT (Reactant); TEM (Technical or engineered material use); RACT (Reactant or reagent); USES (Uses)
(fabrication of multilayer **battery** cell)

IT Secondary **batteries**
(lithium; fabrication of multilayer **battery** cell)

IT Polyimides, uses
RL: DEV (Device component use); USES (Uses)
(**separator**; fabrication of **multilayer battery** cell)

IT 7429-90-5, Aluminum, uses 7440-50-8, Copper, uses
RL: DEV (Device component use); USES (Uses)
(current collector; fabrication of multilayer **battery** cell)

IT 108-32-7, Propylene carbonate 616-38-6, Dimethyl carbonate 7440-44-0, Carbon, uses 12031-65-1, Lithium nickel oxide linio2 12057-17-9, Lithium manganese oxide limn2o4 12190-79-3, Cobalt lithium oxide colio2 21324-40-3, Lithium hexafluorophosphate
RL: DEV (Device component use); USES (Uses)

(fabrication of multilayer **battery** cell)
IT 120479-61-0, Aluminum lithium titanium phosphate Al0.3Li1.3Ti1.7(PO4)3
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(fabrication of multilayer **battery** cell)
IT 26298-81-7, 3,3',4,4'-Biphenyltetracarboxylic dianhydride-4,4'-oxydianiline copolymer
RL: RCT (Reactant); RACT (Reactant or reagent)
(fabrication of multilayer **battery** cell)
IT **9002-88-4, Polyethylene 9003-07-0, Polypropylene**
RL: DEV (Device component use); USES (Uses)
(**separator**; fabrication of **multilayer battery** cell)
RE.CNT 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
(1) Anon; PATENT ABSTRACTS OF JAPAN 1991, V015(394), PE-1119
(2) Anon; PATENT ABSTRACTS OF JAPAN 1991, V015(394), PE-1119
(3) Anon; PATENT ABSTRACTS OF JAPAN 1999, V1999(14)
(4) Fujiwara, N; US 5705292 A 1998 HCAPLUS
(5) Motorola Inc; WO 9923714 A 1999 HCAPLUS
(6) Tdk Corp; JP 11260355 A 1999 HCAPLUS
(7) Yuasa Battery Co Ltd; JP 03159069 A 1991 HCAPLUS
(8) Yuasa Battery Co Ltd; JP 03159070 A 1991 HCAPLUS

L30 ANSWER 8 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2000:133755 HCAPLUS
DN 132:167454
ED Entered STN: 25 Feb 2000
TI Puncture-resistant microporous thermoplastic **film** and preparation and uses thereof
IN Radovanovic, Philip D.; Thomas, Scott D.
PA 3M Innovative Properties Company, USA
SO PCT Int. Appl., 27 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM C08J009-28
ICS B01D067-00; H01M002-14; B29C055-00
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2000009597	A1	20000224	WO 1999-US15085	19990701
	W: CA, JP, KR				
	RW: AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
	US 6096213	A	20000801	US 1998-134142	19980814
	CA 2338549	AA	20000224	CA 1999-2338549	19990701
	EP 1105436	A1	20010613	EP 1999-932215	19990701
	EP 1105436	B1	20030924		
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, FI				
	JP 2002522610	T2	20020723	JP 2000-565038	19990701
PRAI	US 1998-134142	A	19980814		
	WO 1999-US15085	W	19990701		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES

WO 2000009597	ICM	C08J009-28
	ICS	B01D067-00; H01M002-14; B29C055-00
	IPCI	C08J0009-28 [ICM,7]; C08J0009-00 [ICM,7,C*]; B01D0067-00 [ICS,7]; H01M0002-14 [ICS,7]; B29C0055-00 [ICS,7]
	IPCR	B01D0067-00 [I,A]; B01D0067-00 [I,C*]; B01D0071-00 [I,C*]; B01D0071-26 [I,A]; B29C0055-00 [I,A]; B29C0055-00 [I,C*]; C08J0009-00 [I,C*]; C08J0009-28 [I,A]; H01M0002-16 [I,A]; H01M0002-16 [I,C*]
	ECLA	B01D067/00H10D; B01D067/00H10B; B01D071/26; B29C055/00B; C08J009/28; H01M002/16C3
US 6096213	IPCI	B01D0071-06 [ICM,7]; B01D0071-00 [ICM,7,C*]
	IPCR	B01D0067-00 [I,A]; B01D0067-00 [I,C*]; B01D0071-00 [I,C*]; B01D0071-26 [I,A]; B29C0055-00 [I,A]; B29C0055-00 [I,C*]; C08J0009-00 [I,C*]; C08J0009-28 [I,A]; H01M0002-16 [I,A]; H01M0002-16 [I,C*]
	NCL	210/500.360; 210/500.270; 210/500.420; 264/041.000; 264/048.000; 428/319.300
	ECLA	B01D067/00H10D; B01D067/00H10B; B01D071/26; B29C055/00B; C08J009/28; H01M002/16C3
CA 2338549	IPCI	C08J0009-28 [ICM,7]; C08J0009-00 [ICM,7,C*]; B29C0055-00 [ICS,7]; B01D0067-00 [ICS,7]; H01M0002-14 [ICS,7]
EP 1105436	IPCI	C08J0009-28 [ICM,6]; C08J0009-00 [ICM,6,C*]; B01D0067-00 [ICS,6]; H01M0002-14 [ICS,6]; B29C0055-00 [ICS,6]
	IPCR	B01D0067-00 [I,A]; B01D0067-00 [I,C*]; B01D0071-00 [I,C*]; B01D0071-26 [I,A]; B29C0055-00 [I,A]; B29C0055-00 [I,C*]; C08J0009-00 [I,C*]; C08J0009-28 [I,A]; H01M0002-16 [I,A]; H01M0002-16 [I,C*]
JP 2002522610	IPCI	C08J0009-26 [ICM,7]; C08J0009-26 [ICS,7]; C08J0009-00 [ICS,7,C*]; H01M0002-16 [ICS,7]; C08L0101-00 [ICS,7]
	IPCR	B01D0067-00 [I,A]; B01D0067-00 [I,C*]; B01D0071-00 [I,C*]; B01D0071-26 [I,A]; B29C0055-00 [I,A]; B29C0055-00 [I,C*]; C08J0009-00 [I,C*]; C08J0009-28 [I,A]; H01M0002-16 [I,A]; H01M0002-16 [I,C*]

AB A microporous **film** having puncture resistance ≥350 g/25 μ is prepared by (a) melt blending a substantially homogeneous mixture of 25-60 parts melt-processable semicryst. thermoplastic polymer and 40-75 parts of either (1) a compound that is miscible with the thermoplastic polymer at above the polymer m.p. but phase separates when cooled below the crystallization temperature of the polymer or (2) a compatible liquid that is miscible with the thermoplastic polymer at a temperature above the liquid-liquid phase separation temperature but phase separates from the polymer when cooled, (b) forming a shaped material, (c) cooling to cause phase separation, (d) stretching in ≥2 perpendicular directions to an area expansion ratio >9 to provide a network of interconnected pores, and (e) removing the phase-separated compound or compatible liquid The microporous materials can be produced at relatively high rates and at low cost, and are useful for **multilayer** materials and **battery separators.** Thus, HYA 021 (high-d. **polyethylene**) was melt blended with mineral oil (viscosity 60 cSt) and extruded to form a 305 μm-thick **film**, which was stretched simultaneously 6 x 6 (MD x CD), heat-set under restraint for 30 s at 105°, and washed under restraint in dichlorotrifluoroethane (I), to form a 15 μm-thick **film** having Gurley air flow 254 s/10 cc, puncture resistance (ASTM F-1306-90) 645 g/25 μm, porosity 38%, and tensile strength 1000 (MD) and 1100 (CD), compared with a 21 μm-thick **film** having 61, 347, 62,

and 670 and 580, resp., which was washed under restraint in I before stretching.

ST microporous **film** prepn **battery** separator; **polyethylene** mineral oil microporous **film** prepn; puncture resistant microporous thermoplastic **film**

IT Membranes, nonbiological
(microporous; puncture-resistant microporous thermoplastic **film** and preparation and uses thereof)

IT Paraffin waxes, uses
Petroleum spirits
RL: NUU (Other use, unclassified); USES (Uses)
(miscible compound; in manufacture of puncture-resistant microporous thermoplastic **film**)

IT Primary **battery** separators
Secondary **battery** separators
(puncture-resistant microporous thermoplastic **film** and preparation and uses thereof)

IT Ethylene-propylene rubber
Linear low density polyethylenes
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); POF (Polymer in formulation); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(puncture-resistant microporous thermoplastic **film** and preparation and uses thereof)

IT Fluoropolymers, uses
Polyoxyalkylenes, uses
Polyoxymethylenes, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(puncture-resistant microporous thermoplastic **film** and preparation and uses thereof)

IT Polymer blends
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(puncture-resistant microporous thermoplastic **film** and preparation and uses thereof)

IT Plastic **films**
(thermo-; puncture-resistant microporous thermoplastic **film** and preparation and uses thereof)

IT Paraffin oils
RL: NUU (Other use, unclassified); USES (Uses)
(white oils, miscible compound; in manufacture of puncture-resistant microporous thermoplastic **film**)

IT **9002-88-4**, **Polyethylene**
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); POF (Polymer in formulation); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(HYA 021, high-d.; puncture-resistant microporous thermoplastic **film** and preparation and uses thereof)

IT 74-85-1D, Ethene, polymers with α-olefins, polymers with α-olefins, uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); POF (Polymer in formulation); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(LLDPE; puncture-resistant microporous thermoplastic **film** and preparation and uses thereof)

IT **9003-07-0**, DS 5D45 25213-02-9, SLP 9057
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); POF (Polymer in formulation); TEM (Technical or engineered

material use); PROC (Process); USES (Uses)
(blends; puncture-resistant microporous thermoplastic **film** and preparation and uses thereof)
IT 9010-79-1
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); POF (Polymer in formulation); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(ethylene-propylene rubber, puncture-resistant microporous thermoplastic **film** and preparation and uses thereof)
IT 84-61-7, Dicyclohexyl phthalate 95-50-1, o-Dichlorobenzene 103-50-4, Dibenzyl ether 109-43-3, Dibutyl sebacate 112-53-8, 1-Dodecanol 112-92-5, 1-Octadecanol 115-86-6, Triphenyl phosphate 117-81-7 9005-02-1, **Polyethylene** glycol dilaurate 12002-48-1, Trichlorobenzene 36653-82-4, Hexadecyl alcohol
RL: NUU (Other use, unclassified); USES (Uses)
(miscible compound; in manufacture of puncture-resistant microporous thermoplastic **film**)
IT 9003-28-5, 1-Butene homopolymer 26221-73-8, Dowlex 2038
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); POF (Polymer in formulation); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(puncture-resistant microporous thermoplastic **film** and preparation and uses thereof)
IT 24937-79-9, Poly(vinylidene fluoride) 24981-14-4, Poly(vinyl fluoride) 25067-34-9, Ethylene-vinyl alcohol copolymer 25101-45-5, Chlorotrifluoroethylene-ethylene copolymer 25322-68-3
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(puncture-resistant microporous thermoplastic **film** and preparation and uses thereof)
RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
(1) James, M; US 4726989 A 1988
(2) Kevin, K; US 4867881 A 1989 HCAPLUS
(3) Mitsubishi Chem Corp; EP 0767200 A 1997 HCAPLUS
(4) Mitsubishi Chem Ind; EP 0603500 A 1994 HCAPLUS

L30 ANSWER 9 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 2000:823112 HCAPLUS
DN 133:364429
ED Entered STN: 24 Nov 2000
TI Nonaqueous secondary **batteries** and microporous **polyethylene** laminates for their separators
IN Watari, Yukihiro; Aoki, Takashi
PA Japan Storage Battery Co., Ltd., Japan; GS Melcotec K. K.
SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM H01M002-16
ICS H01M010-40
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 2000323115	A2	20001124	JP 1999-126573	19990507
PRAI	JP 1999-126573		19990507		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 2000323115	ICM	H01M002-16
	ICS	H01M010-40
	IPCI	H01M0002-16 [ICM,7]; H01M0010-40 [ICS,7]
	IPCR	H01M0002-16 [I,A]; H01M0002-16 [I,C*]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]

AB The **separators** are **multilayered** laminates of microporous **polyethylene** with polymer layers having higher m.p. than the **polyethylene** layer and ≥1 of the polymer layers are formed by biaxial stretching. Nonaq. secondary **batteries** with the separators are also claimed. Safe **batteries** are obtained by using the separators having excellent dimensional stability.

ST nonaq secondary **battery** safe separator; microporous **polyethylene** laminated secondary **battery** separator; biaxially stretched **polypropylene** laminate **battery** separator

IT Porous materials
(**films**, plastic laminates; laminates of microporous **polyethylene films** and biaxially-stretched polymer **films** as separators for safe nonaq. secondary **batteries**)

IT Secondary **battery** separators
(laminates of microporous **polyethylene films** and biaxially-stretched polymer **films** as separators for safe nonaq. secondary **batteries**)

IT **Films**
(porous, plastic laminates; laminates of microporous **polyethylene films** and biaxially-stretched polymer **films** as separators for safe nonaq. secondary **batteries**)

IT Laminated plastics, uses
RL: DEV (Device component use); USES (Uses)
(porous; laminates of microporous **polyethylene films** and biaxially-stretched polymer **films** as separators for safe nonaq. secondary **batteries**)

IT **9003-07-0, Polypropylene**
RL: DEV (Device component use); USES (Uses)
(biaxially-stretched; laminates of microporous **polyethylene films** and biaxially-stretched polymer **films** as separators for safe nonaq. secondary **batteries**)

IT **9002-88-4, Polyethylene**
RL: DEV (Device component use); USES (Uses)
(microporous; laminates of microporous **polyethylene films** and biaxially-stretched polymer **films** as separators for safe nonaq. secondary **batteries**)

L30 ANSWER 10 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1999:270896 HCAPLUS
DN 130:269684
ED Entered STN: 03 May 1999
TI Methods of fabricating electrochemical cells
IN Menon, Krishna; Rundle, Wayne T.
PA Valence Technology, Inc., USA
SO U.S., 9 pp.
CODEN: USXXAM
DT Patent
LA English
IC ICM H01M002-16
INCL 029623100

CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38

FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI US 5894656	A	19990420	US 1997-840089	19970411
PRAI US 1997-840089		19970411		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
US 5894656	ICM	H01M002-16
	INCL	029623100
	IPCI	H01M0002-16 [ICM,6]
	IPCR	H01M0002-16 [I,A]; H01M0002-16 [I,C*]; H01M0006-16 [N,A]; H01M0006-16 [N,C*]; H01M0006-18 [N,A]; H01M0006-18 [N,C*]; H01M0006-40 [N,A]; H01M0006-40 [N,C*]; H01M0010-04 [I,A]; H01M0010-04 [I,C*]; H01M0010-36 [I,C*]; H01M0010-40 [I,A]
	NCL	029/623.100; 429/162.000; 429/251.000
	ECLA	H01M002/16E; H01M010/04F; H01M010/40L

AB Electrochem. cells with improved adhesion of the laminant components can be fabricated by forming an electrode directly on the surface of electrolyte or separator **film.** This process obviates the need to prepare the anode or cathode in a sep. procedure. A method of preparing an electrode/separator assembly comprises the steps of: (a) preparing a polymer mixture comprising a first polymer, a first polymer solvent, and a first plasticizer, (b) applying a layer of the polymer mixture onto a first substrate and removing first polymer solvent from the layer of the polymer mixture to form a coated substrate having a first polymer matrix **film** coated on the first substrate, (c) preparing an electrode mixture comprising an electrode active material, a second polymer, a second polymer solvent, and a second plasticizer, (d) applying a layer of the electrode mixture on the first polymer matrix **film** and removing second polymer solvent from the layer of electrode mixture to form a first electrode/**separator bilayer** having a first electrode **film** coated on the first polymer matrix **film**, and (e) attaching a current collector on the first electrode **film.**

ST **battery** electrode separator assembly

IT **Battery** anodes
Battery cathodes
Secondary **battery** separators
(methods of fabricating electrode/separator assembly for electrochem. cells)

IT Polyesters, uses
RL: DEV (Device component use); USES (Uses)
(methods of fabricating electrode/separator assembly for electrochem. cells)

IT Coke
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(methods of fabricating electrode/separator assembly for electrochem. cells)

IT Paper
(substrate; methods of fabricating electrode/separator assembly for electrochem. cells)

IT 7440-44-0, Carbon, uses
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(mesocarbon; methods of fabricating electrode/separator assembly for electrochem. cells)

IT **9002-88-4, Polyethylene 9003-07-0, Polypropylene** 9011-17-0, Hexafluoropropylene-vinylidenefluoride copolymer
RL: DEV (Device component use); USES (Uses)
(methods of fabricating electrode/separator assembly for electrochem. cells)
IT 7782-42-5, Graphite, uses 39300-70-4, Lithium nickel oxide 39457-42-6, Lithium manganese oxide 52627-24-4, Cobalt lithium oxide
RL: DEV (Device component use); TEM (Technical or engineered material use); USES (Uses)
(methods of fabricating electrode/separator assembly for electrochem. cells)
IT 67-64-1, Acetone, uses
RL: TEM (Technical or engineered material use); USES (Uses)
(methods of fabricating electrode/separator assembly for electrochem. cells)
RE.CNT 4 THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
(1) Gozdz; US 5418091 1995 HCAPLUS
(2) Gozdz; US 5607485 1997 HCAPLUS
(3) Itou; US 5605548 1997 HCAPLUS
(4) Muller; US 5100746 1992 HCAPLUS

L30 ANSWER 11 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1999:267167 HCAPLUS
DN 130:297704
ED Entered STN: 30 Apr 1999
TI Heat-resistant multilayer porous **films** with improved wettability for electrolytic solutions
IN Kiuchi, Masayuki; Fujii, Teruaki
PA Ube Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 7 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM B32B005-32
ICS B32B005-18; B32B027-32; H01G009-02; H01M002-16
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52, 76
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 11115084	A2	19990427	JP 1997-280190	19971014
PRAI	JP 1997-280190		19971014		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 11115084	ICM	B32B005-32
	ICS	B32B005-18; B32B027-32; H01G009-02; H01M002-16
	IPCI	B32B0005-32 [ICM,6]; B32B0005-18 [ICS,6]; B32B0027-32 [ICS,6]; H01G0009-02 [ICS,6]; H01M0002-16 [ICS,6]
	IPCR	B32B0005-18 [I,A]; B32B0005-18 [I,C*]; B32B0005-22 [I,C*]; B32B0005-32 [I,A]; B32B0027-32 [I,A]; B32B0027-32 [I,C*]; H01G0009-02 [I,A]; H01G0009-02 [I,C*]; H01M0002-16 [I,A]; H01M0002-16 [I,C*]

AB Title ≥3-layer **films**, suitable for separators for **batteries** or electrolytic capacitors, satisfy Gurley value 100-700 s/100 mL and comprise high m.p. porous polyolefins and low m.p. porous polyolefins with their m.p. difference ≥20°. Surface layers of the **films** are prepared from porous **polyethylene**

having elastic modulus ≥104 dyne/cm2 within range of shutdown temps. The multilayer **films** show good shutdown properties. Thus, Ube Polypro F 103EA (**polypropylene**; m.p. 166°; MI 3) **film** was sandwiched between Hizex 5202B (**polyethylene**; m.p. 132°; MI 0.33), stretched, relaxed, and heat set to give 3-layer porous **film** showing porosity 47%, static friction coefficient 0.38, and contact angle 46°.

ST **polyethylene polypropylene** heat resistant porous **film**; **polypropylene multilayer film** wettability **battery separator**; polyolefin **multilayer film** electrolytic capacitor **separator**; shutdown property porous **polyethylene film**

IT Heat-resistant materials
Porous materials
(**films**; heat-resistant multilayer porous **films** with improved wettability for electrolytic solns.)

IT Electrolytic capacitors
Secondary **battery separators**
(heat-resistant **multilayer** porous **films** with improved wettability for electrolytic solns.)

IT Polyolefins
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(heat-resistant multilayer porous **films** with improved wettability for electrolytic solns.)

IT **Films**
(heat-resistant; heat-resistant multilayer porous **films** with improved wettability for electrolytic solns.)

IT **Films**
(multilayer; heat-resistant multilayer porous **films** with improved wettability for electrolytic solns.)

IT **Films**
(porous; heat-resistant multilayer porous **films** with improved wettability for electrolytic solns.)

IT **9003-07-0**, Ube Polypro F 103EA
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(middle layer; heat-resistant multilayer porous **films** with improved wettability for electrolytic solns.)

IT **9002-88-4**, Hizex 5202B
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(surface layer; heat-resistant multilayer porous **films** with improved wettability for electrolytic solns.)

L30 ANSWER 12 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1999:156681 HCAPLUS
DN 130:238544
ED Entered STN: 10 Mar 1999
TI Porous polymer **films** for **battery** separators and electrolytic capacitors
IN Kiuchi, Masayuki; Fujii, Teruaki
PA Ube Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM C08J009-00
ICS B32B005-18; B32B005-32; H01G009-02; H01M002-16; B29C055-02; B29K023-00; B29L009-00

CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 11060764	A2	19990305	JP 1997-226240	19970822
	JP 3536607	B2	20040614		
PRAI	JP 1997-226240		19970822		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 11060764	ICM	C08J009-00
	ICS	B32B005-18; B32B005-32; H01G009-02; H01M002-16; B29C055-02; B29K023-00; B29L009-00
	IPCI	C08J0009-00 [ICM,6]; B32B0005-18 [ICS,6]; B32B0005-32 [ICS,6]; H01G0009-02 [ICS,6]; H01M0002-16 [ICS,6]; B29C0055-02 [ICS,6]; B29K0023-00 [ICS,6]; B29L0009-00 [ICS,6]

AB The title **films** in oriented forms satisfy condition of having elastic modulus ≥104 dyne/cm2 within range of shutdown temps. Thus, Hi-zex 5202B (HDPE) **film** was sandwiched between UBE Polypro F 103EA **films** to give a 3-layer **film**, which was stretched 20% at 35°, subsequently 180% at 126°, relaxed 17%, and heat-set. The resulting porous **film** showed Gurley value 550 s/100 mL, porosity 45%, tensile strength (ASTM D 822) 15 kg/mm2 in the machine direction (MD) and 1.3 kg/mm2 in the transverse direction (TD), and shrinkage ratio after 1-h storage at 135° 41% and -2% in the MD and TD, resp.

ST **polypropylene** porous **multilayer film** manuf **battery separator**; HDPE porous **film** manuf electrolytic capacitor separator

IT Porous materials
(**films**; manufacture of porous polymer **films** for **battery** separators or electrolytic capacitors)

IT Laminated plastic **films**
Secondary **battery** separators
(manufacture of porous polymer **films** for **battery** separators or electrolytic capacitors)

IT **Films**
(porous; manufacture of porous polymer **films** for **battery** separators or electrolytic capacitors)

IT Electrolytic capacitors
(separators; manufacture of porous polymer **films** for **battery** separators or electrolytic capacitors)

IT **9002-88-4**, Hi-Zex 5202B
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(middle layer; manufacture of porous polymer **films** for **battery** separators or electrolytic capacitors)

IT **9003-07-0**, UBE Polypro F 103EA
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(outer layer; manufacture of porous polymer **films** for **battery** separators or electrolytic capacitors)

L30 ANSWER 13 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1999:156680 HCAPLUS
DN 130:238543
ED Entered STN: 10 Mar 1999
TI Porous polymer **films** for **battery** separators or

electrolytic capacitors
IN Kiuchi, Masayuki; Fujii, Teruaki
PA Ube Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM C08J009-00
ICS B32B005-18; B32B005-32; H01G009-02; H01M002-16
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 11060763	A2	19990305	JP 1997-226239	19970822
PRAI JP 1997-226239		19970822		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 11060763	ICM	C08J009-00
	ICS	B32B005-18; B32B005-32; H01G009-02; H01M002-16
	IPCI	C08J0009-00 [ICM,6]; B32B0005-18 [ICS,6]; B32B0005-32 [ICS,6]; H01G0009-02 [ICS,6]; H01M0002-16 [ICS,6]

AB The title **films** in oriented forms satisfy condition of having viscosity ≥103 P within range of shutdown temps. Thus, Hi-zex 5202B (HDPE) **film** was sandwiched with UBE Polypro F 103EA **films** to give a 3-layer **film**, which was stretched 20% at 35°, subsequently 180% at 126°, relaxed 17%, and heat-set. The resulting porous **film** showed Gurley value 550 s/100 mL, porosity 45%, tensile strength (ASTM D 822) 15 kg/mm2 in the machine direction (MD) and 1.3 kg/mm2 in the transverse direction (TD), and shrinkage ratio after 1-h storage at 135° 41% and -2% in the MD and TD, resp.

ST **polypropylene** porous **multilayer film** manuf **battery separator**; HDPE porous **film** manuf electrolytic capacitor

IT Porous materials
(**films**; manufacture of porous polymer **films** for **battery** separators or electrolytic capacitors)

IT Laminated plastic **films**
Secondary **battery** separators
(manufacture of porous polymer **films** for **battery** separators or electrolytic capacitors)

IT **Films**
(porous; manufacture of porous polymer **films** for **battery** separators or electrolytic capacitors)

IT Electrolytic capacitors
(separators; manufacture of porous polymer **films** for **battery** separators or electrolytic capacitors)

IT **9002-88-4**, Hi-Zex 5202B
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(middle layer; manufacture of porous polymer **films** for **battery** separators or electrolytic capacitors)

IT **9003-07-0**, UBE Polypro F 103EA
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(outer layer; manufacture of porous polymer **films** for **battery** separators or electrolytic capacitors)

L30 ANSWER 14 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1999:32317 HCAPLUS
DN 130:84070
ED Entered STN: 18 Jan 1999
TI **Multilayer**-structured **separators** for nonaqueous-electrolyte **batteries**
IN Uetani, Yoshihiro; Ohtani, Akira
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 6 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM H01M002-16
ICS H01M002-16; B32B005-32; C08J009-00; C08L023-02
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 11007935	A2	19990112	JP 1997-156390	19970613
PRAI JP 1997-156390		19970613		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 11007935	ICM	H01M002-16
	ICS	H01M002-16; B32B005-32; C08J009-00; C08L023-02
	IPCI	H01M0002-16 [ICM,6]; H01M0002-16 [ICS,6]; B32B0005-32 [ICS,6]; C08J0009-00 [ICS,6]; C08L0023-02 [ICS,6]

AB The **separators** are porous **multilayered films** comprising ≥3 layers made of different materials or materials having different compns. The separators containing (a) a layer of 20:80-80:20 weight blends of incompatible resins, (b) a layer mainly consisting of a resin having m.p. ≤140°, and (c) a layer mainly consisting of material having m.p. ≥160°, with at least 1 of the outermost layer consisting of b, or (A) a layer which prevents short circuit of the electrodes due to precipitation of Li on anode during charging, (B) a layer which melts by heating to ≤140° and forms coatings on precipitated Li for prevention of **battery** reactions, and (C) a layer with maintains the separator shape at ≥140°, with at least 1 of the outermost layer consisting of B. Short circuit and exothermic reaction due to precipitation of Li are prevented. The **batteries** show low-temperature shut down, excellent high-temperature shape maintaining property, and are safe.

ST safe nonaq electrolyte **battery multilayered separator**; lithium secondary **battery** separator; polymer blend porous separator **battery**

IT Secondary **battery separators**
(**multilayered separators** for safe lithium secondary **batteries**)

IT Polymer blends
RL: DEV (Device component use); POF (Polymer in formulation); USES (Uses)
(**polypropylene-polyethylene; multilayered separators** for safe lithium secondary **batteries**)

IT 7439-93-2, Lithium, occurrence
RL: OCU (Occurrence, unclassified); OCCU (Occurrence)
(prevention of harm by precipitated; **multilayered separators** for safe lithium secondary **batteries**)

IT **9002-88-4, Polyethylene 9003-07-0,**

Polypropylene
RL: DEV (Device component use); POF (Polymer in formulation); USES (Uses)
(**separator** component; **multilayered separators** for safe lithium secondary **batteries**)

L30 ANSWER 15 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1998:768154 HCAPLUS
DN 130:4708
ED Entered STN: 08 Dec 1998
TI Porous polyolefin **films** with stable gas permeability for **battery** separators and their manufacture
IN Ishisaki, Tetsu; Tojo, Yasuhisa; Higuchi, Hiroyuki; Furuuchi, Koji
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM C08J009-00
ICS B29C055-02; B29K105-04; B29L009-00; C08L023-02
CC 38-3 (Plastics Fabrication and Uses)
Section cross-reference(s): 52
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 10316781	A2	19981202	JP 1997-130178	19970520
PRAI JP 1997-130178		19970520		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 10316781	ICM	C08J009-00
	ICS	B29C055-02; B29K105-04; B29L009-00; C08L023-02
	IPCI	C08J0009-00 [ICM,6]; B29C0055-02 [ICS,6]; B29K0105-04 [ICS,6]; B29L0009-00 [ICS,6]; C08L0023-02 [ICS,6]
	IPCR	B29C0055-02 [I,A]; B29C0055-02 [I,C*]; C08J0009-00 [I,A]; C08J0009-00 [I,C*]

AB The **films** satisfy shrinking stress ≤5 g for 0.1-mm2 cross-sectional area in heating at 25-80°, thermal shrinkage (60° + 1 h) ≤3%, and tensile flexural modulus (25°) ≥5000 kg/cm2. The **films** are manufactured by these steps; annealing multilayer material **films** at 50-170° for 5 s-150 h, 10-150% rolling at (-20)-100°, 10-300% rolling at 100-140°, annealing at 50-140° for 5 s-150 h, and again annealing at 50-140° for 5 s-150 h. The precursor **films** include layers which contain materials of m.p. 100-140° and layers which contain materials of m.p. ≥150°. Thus, a 11-μm-thick layer of 50:50 (%) **polypropylene** (I; Mw 98 + 104)/HDPE (Mw 26 + 104), sandwiched by pair of I layers, was extruded, annealed between a pair of PET **films**, wounded, stretched, relaxed, annealed at 110° for 36 h, relaxed, and annealed again at 110° for 36 h to give a porous **film** showing tensile flexural modulus 7500, shrinking stress (25°) 0 and 0.7 g, thermal shrinkage 0.5%, and Galley gas permeability 600 s.
ST **battery** separator permeability stable polyolefin **film**; annealing **battery** separator porous **polypropylene** **film**; porous **battery** separator gas permeability stability; HDPE **polypropylene** blend core **battery** separator
IT Porous materials
(**films**; manufacture of polyolefin multilayer porous **films**

for **battery** separators with stable gas permeability)
IT Annealing
Secondary **battery separators**
(manufacture of polyolefin **multilayer** porous **films** for **battery** separators with stable gas permeability)
IT Laminated plastics, uses
RL: PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(manufacture of polyolefin multilayer porous **films** for **battery** separators with stable gas permeability)
IT **Films**
(porous; manufacture of polyolefin multilayer porous **films** for **battery** separators with stable gas permeability)
IT **9002-88-4, Polyethylene**
RL: PEP (Physical, engineering or chemical process); POF (Polymer in formulation); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(high-d., porous; manufacture of polyolefin multilayer porous **films** for **battery** separators with stable gas permeability)
IT **9003-07-0, Polypropylene**
RL: PEP (Physical, engineering or chemical process); POF (Polymer in formulation); PRP (Properties); TEM (Technical or engineered material use); PROC (Process); USES (Uses)
(porous; manufacture of polyolefin multilayer porous **films** for **battery** separators with stable gas permeability)

L30 ANSWER 16 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1998:586414 HCAPLUS
DN 129:262849
ED Entered STN: 15 Sep 1998
TI Porous **films** and **battery** separators with improved low-temperature shut-down capability therefrom
IN Wano, Takashi; Nishiyama, Souji; Matsushita, Kiichiro
PA Nitto Denko Corp., Japan
SO Jpn. Kokai Tokkyo Koho, 5 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM C08J009-00
ICS B32B027-32; H01M002-16
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 10237202	A2	19980908	JP 1997-42710	19970226
PRAI JP 1997-42710		19970226		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 10237202	ICM	C08J009-00
	ICS	B32B027-32; H01M002-16
	IPCI	C08J0009-00 [ICM,6]; B32B0027-32 [ICS,6]; H01M0002-16 [ICS,6]
	IPCR	H01M0002-16 [I,A]; H01M0002-16 [I,C*]
	ECLA	H01M002/16C3

AB The title ≥3-layer **films**, suitable for separators of nonaq. electrolytic solns. in **batteries**, consist of at least (a) a middle layer prepared from mixts. of **polyethylene** (I; melt index ≤0.35) and **polypropylene** (II) and (b) layers of II on the

outsides of the middle layer and satisfy the relation 2% ≤ I content < 30%. Thus, isotactic II and an 80:20 mixture of HDPE (MI 0.3) and isotactic II were extruded to give a 3-layer **film**, which was heat-treated at 135° for 60 h, stretched, and shrunk. The resulting porous **film** showed I 20%, a peel strength of 100 g/10 mm, and a shut-down initiation temperature of 126°.

ST HDPE **polypropylene** blend laminate **battery** separator; **polyethylene** isotactic **polypropylene** porous **film**

IT Porous materials
(**films**; **battery separators** from **multilayer** polymer)

IT Primary **battery separators**
(from porous **multilayer** polymer **films**)

IT Polymer blends
RL: POF (Polymer in formulation); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(porous **multilayer films** for **battery separators** from)

IT Laminated plastics, uses
RL: POF (Polymer in formulation); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(porous multilayer **films** from, for **battery** separators)

IT **Films**
(porous; **battery separators** from **multilayer** polymer)

IT **9002-88-4, Polyethylene**
RL: POF (Polymer in formulation); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(high-d.; porous **multilayer films** for **battery separators** from)

IT 25085-53-4, Isotactic **polypropylene**
RL: POF (Polymer in formulation); PRP (Properties); TEM (Technical or engineered material use); USES (Uses)
(porous **multilayer films** for **battery separators** from)

L30 ANSWER 17 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1997:168610 HCAPLUS
DN 126:159785
ED Entered STN: 13 Mar 1997
TI Packaging for electrochemical charge storage device and device using this packaging
IN Louie, Edmond; Reichert, Veronica R.; Anani, Anaba A.; Zhang, Jinshan
PA Motorola Inc., USA
SO PCT Int. Appl., 18 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM H01M002-00
ICS B32B001-08
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38, 76
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 9701869	A1	19970116	WO 1996-US9165	19960604
W: CN, JP, KR				
RW: AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE				
EP 963613	A1	19991215	EP 1996-919133	19960604

R: DE, FR, GB

PRAI US 1995-494463 A 19950626
WO 1996-US9165 W 19960604

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
WO 9701869	ICM	H01M002-00
	ICS	B32B001-08
	IPCI	H01M0002-00 [ICM,6]; B32B0001-08 [ICS,6]; B32B0001-00 [ICS,6,C*]
	IPCR	B32B0027-32 [I,A]; B32B0027-32 [I,C*]; H01M0002-02 [I,A]; H01M0002-02 [I,C*]; H01M0002-12 [N,A]; H01M0002-12 [N,C*]; H01M0010-04 [I,A]; H01M0010-04 [I,C*]; H02G0009-00 [I,C*]; H02G0009-08 [I,A]
EP 963613	IPCI	H01M0002-00 [ICM,6]; B32B0001-08 [ICS,6]; B32B0001-00 [ICS,6,C*]
	IPCR	B32B0027-32 [I,A]; B32B0027-32 [I,C*]; H01M0002-02 [I,A]; H01M0002-02 [I,C*]; H01M0002-12 [N,A]; H01M0002-12 [N,C*]; H01M0010-04 [I,A]; H01M0010-04 [I,C*]; H02G0009-00 [I,C*]; H02G0009-08 [I,A]

AB The device includes 1st and 2nd electrodes with attached resp. 1st and 2nd current collectors, and electrolyte disposed between the electrodes and 1st and **2nd** metal foils to **sep.** the electrodes from a packaging material. The packaging material consists of multilayered 1st and 2nd polymeric packaging **films** which enclose the other components of the device, and are sealed to each other. The device is an aqueous **battery**, a gel **battery**, a solid-state **battery** cell, or an electrochem. capacitor.

ST packaging polymeric electrochem charge storage device; **battery** polymeric packaging; capacitor polymeric packaging

IT Packaging materials
(for electrochem. charge storage device and device using this packaging)

IT Fluoropolymers, uses
Polyesters, uses
RL: DEV (Device component use); USES (Uses)
(for packaging for electrochem. charge storage device and device using this packaging)

IT Electrolytic capacitors
Primary **batteries**
Secondary **batteries**
(packaging for electrochem. charge storage device and device using this packaging)

IT 9002-85-1, Poly(vinylidene chloride) 9002-86-2, PVC **9002-88-4**, **Polyethylene 9003-07-0**, **Polypropylene**
RL: DEV (Device component use); USES (Uses)
(for packaging for electrochem. charge storage device and device using this packaging)

L30 ANSWER 18 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1997:435712 HCAPLUS
DN 127:66869
ED Entered STN: 14 Jul 1997
TI Manufacture of multilayer porous polyolefin **films**
IN Kurauchi, Masahiro; Akazawa, Tetsuo; Kawabata, Akira
PA Ube Industries, Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 9 pp.
CODEN: JKXXAF
DT Patent
LA Japanese

IC ICM B29C055-02
ICS B29C043-20; B29C043-52; B29C069-00; B32B005-18; B32B027-32; B29K023-00; B29K105-04; B29L009-00
CC 38-2 (Plastics Fabrication and Uses)
Section cross-reference(s): 48
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 09117959	A2	19970506	JP 1995-275631	19951024
PRAI JP 1995-275631		19951024		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 09117959	ICM	B29C055-02
	ICS	B29C043-20; B29C043-52; B29C069-00; B32B005-18; B32B027-32; B29K023-00; B29K105-04; B29L009-00
	IPCI	B29C0055-02 [ICM,6]; B29C0043-20 [ICS,6]; B29C0043-52 [ICS,6]; B29C0069-00 [ICS,6]; B32B0005-18 [ICS,6]; B32B0027-32 [ICS,6]; B29K0023-00 [ICS,6]; B29K0105-04 [ICS,6]; B29L0009-00 [ICS,6]

AB The title **films**, with high peel strength, uniform cells, good thrust resistance, and no curling, useful for separators of **batteries** and capacitors, insulators, filters, etc. (no data), are manufactured from ≥3 layers of **polypropylene films** with surface tension 35-55 dyne/cm2 and **polyethylene films** with surface tension 35-55 dyne/cm2, by pressing at 134-140°, heat treating at 110-140°, stretching 5-200% at between -20° and +50°, stretching 100-400% at 70-130°, and heat treating at 5-45° higher than the last stretching temperature

ST **polypropylene polyethylene** laminated porous **film**; **battery separator** polyolefin **multilayer** porous **film**; capacitor **separator** polyolefin **multilayer** porous **film**; insulator polyolefin multilayer porous **film**; filter polyolefin multilayer porous **film**

IT Porous materials
Porous materials
(**films**; manufacture of multilayer porous polyolefin **films**)

IT Adhesion, physical
Expansion
Impact-resistant materials
Lamination
(manufacture of multilayer porous polyolefin **films**)

IT Laminated plastics, processes
Polyolefins
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(manufacture of multilayer porous polyolefin **films**)

IT **Films**
Films
(porous; manufacture of multilayer porous polyolefin **films**)

IT **9002-88-4**, **Polyethylene 9003-07-0**, **Polypropylene**
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PROC (Process)
(manufacture of multilayer porous polyolefin **films**)

L30 ANSWER 19 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN

AN 1995:997826 HCAPLUS
DN 124:33733
ED Entered STN: 22 Dec 1995
TI Porous **multilayer film** for **separator** of nonaqueous-electrolyte **battery**
IN Kurauchi, Hiroshi C. O. Hirakata; Akazawa, Tetuo C. O. Hirakata Lab; Kawabata, Akira C. O. Hirakata La
PA Ube Industries, Ltd., Japan
SO Eur. Pat. Appl., 17 pp.
CODEN: EPXXDW
DT Patent
LA English
IC ICM H01M002-16
ICS B32B027-32; C08J005-18
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
Section cross-reference(s): 38
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	EP 682376	A1	19951115	EP 1995-107221	19950512
	EP 682376	B1	20000126		
	R: DE, FR, GB				
	JP 07304110	A2	19951121	JP 1994-98394	19940512
	JP 3003830	B2	20000131		
	JP 07307146	A2	19951121	JP 1994-98395	19940512
	JP 3011309	B2	20000221		
	US 5691047	A	19971125	US 1995-440075	19950512
	CA 2149284	C	20020430	CA 1995-2149284	19950512
PRAI	JP 1994-98394	A	19940512		
	JP 1994-98395	A	19940512		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
EP 682376	ICM	H01M002-16
	ICS	B32B027-32; C08J005-18
	IPCI	H01M0002-16 [ICM,6]; B32B0027-32 [ICS,6]; C08J0005-18 [ICS,6]
	IPCR	B32B0027-32 [I,A]; B32B0027-32 [I,C*]; H01M0002-16 [I,A]; H01M0002-16 [I,C*]
	ECLA	B32B027/32; H01M002/16C3
JP 07304110	IPCI	B29D0009-00 [ICM,6]; B29D0007-01 [ICS,6]; B29D0007-00 [ICS,6,C*]; B32B0005-18 [ICS,6]; C08J0009-00 [ICS,6]; B29K0023-00 [ICI,6]; C08L0023-02 [ICI,6]; C08L0023-00 [ICI,6,C*]
JP 07307146	IPCI	H01M0002-16 [ICM,6]; H01M0010-40 [ICS,6]; H01M0010-36 [ICS,6,C*]
US 5691047	IPCI	B32B0003-26 [ICM,6]; B32B0027-32 [ICS,6]; H01M0002-16 [ICS,6]
	IPCR	B32B0027-32 [I,A]; B32B0027-32 [I,C*]; H01M0002-16 [I,A]; H01M0002-16 [I,C*]
	NCL	428/315.700; 428/315.900; 428/316.600; 428/517.000; 429/145.000
	ECLA	B32B027/32; H01M002/16C3
CA 2149284	IPCI	B32B0005-18 [ICM,6]; H01M0002-14 [ICS,6]; B32B0027-32 [ICS,6]

AB The **film** comprises ≥3 united polyolefin layers, in which ≥1 layer is a **polyethylene** layer and ≥1 layer is a **polypropylene** layer which is placed in contact with the **polyethylene** layer. The polyolefin layers are combined to form a united structure with a peel strength of ≥3 g/15 mm, a pore volume of

30-80%, a maximum pore size of 0.2-2 μm, a shutdown temperature of 135-140°, and a thermal durability to maintain the shutdown condition to ≥180°.

ST **battery separator** porous **multilayer** polyolefin; **polyethylene polypropylene** porous **multilayer battery separator**

IT **Batteries**, secondary
(**separators**, porous **multilayer film** for nonaq.-electrolyte)

IT **9002-88-4, Polyethylene 9003-07-0, Polypropylene**
RL: DEV (Device component use); USES (Uses)
(porous **multilayer film** for **separator** of nonaq.-electrolyte **battery** containing layer of)

L30 ANSWER 20 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1989:500368 HCAPLUS
DN 111:100368
ED Entered STN: 16 Sep 1989
TI Secondary alkaline zinc **battery**
IN Furukawa, Sanehiro; Inoe, Kenji; Nogami, Mitsuzo
PA Sanyo Electric Co., Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 3 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC ICM H01M002-16
ICS H01M010-28
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	JP 01077868	A2	19890323	JP 1987-235089	19870918
	JP 06105610	B4	19941221		
PRAI	JP 1987-235089		19870918		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 01077868	ICM	H01M002-16
	ICS	H01M010-28
	IPCI	H01M0002-16 [ICM,4]; H01M0010-28 [ICS,4]; H01M0010-24 [ICS,4,C*]
	ECLA	H01M002/14; H01M010/28

AB The title **battery** has a **multilayer separator** between a Zn anode and a cathode, where the separator is prepared from microporous **films** of different pore diams. with the **film** of the smallest pore diameter being closest to the anode. The **films** preferably have a thickness of 10-40 μm. This **battery** has long cycle life.

ST zinc **battery multilayer separator**

IT Polyamide fibers, uses and miscellaneous
RL: USES (Uses)
(fabrics, separators containing porous **polypropylene** and **polyethylene films** and, for secondary alkaline zinc **batteries**)

IT **Batteries**, secondary
(separators, laminates of nylon fabrics and **polypropylene** and **polyethylene films** for)

IT **9002-88-4, Polyethylene 9003-07-0, Polypropylene**

RL: USES (Uses)
(**films**, separators containing nylon fabrics and porous, for secondary alkaline zinc **batteries**)

L30 ANSWER 21 OF 23 JAPIO (C) 2006 JPO on STN
AN 1983-133761 JAPIO
TI SEALED ALKALINE **BATTERY**
IN OKI SATORU
PA CITIZEN WATCH CO LTD
PI JP 58133761 A 19830809 Showa
AI JP 1982-15902 (JP57015902 Showa) 19820203
PRAI JP 1982-15902 19820203
SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 1983
IC ICM H01M002-16
AB PURPOSE: To increase the liquid-leakage resistant performance of a sealed alkaline **battery** by suppressing the increase of the internal pressure of the **battery** by absorbing hydrogen, which is produced according to the self dissolution of a negative agent, by means of a metal interposed in a separator, and to increase the life of the **battery** by suppressing the self reaction of a positive agent caused by hydrogen. CONSTITUTION: A sealed alkaline **battery** is constituted of a negative agent 2 made of zinc, a positive agent 8 made of argentous oxide or silver oxide, electrolyte made of an aqueous alkali solution, and a separator which consists of protection **films** 4 and 7 made of a plastic such as **polypropylene**, **polyethylene** or nylon, a semipermeable member 5 made of cellophane and a non-woven fabric 3. In such a **battery**, a member 6 made of a net, a porous foil plate or a powder paste of a metal such as Pd, Pt, or Ni which has a property of absorbing a large amount of hydrogen, is interposed between the **multilayers** of the **separator** itself. Owing to such a constitution, hydrogen produced on the negative electrode 2 side can be trapped with high efficiency.
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L30 ANSWER 22 OF 23 HCAPLUS COPYRIGHT 2006 ACS on STN
AN 1979:476877 HCAPLUS
DN 91:76877
ED Entered STN: 12 May 1984
TI Separators for alkaline **batteries**
IN Nagamine, Akio; Iizuka, Kazuo; Takagishi, Hitoshi
PA Ray-O-Vac Co., (Japan) Ltd., Japan
SO Jpn. Kokai Tokkyo Koho, 3 pp.
CODEN: JKXXAF
DT Patent
LA Japanese
IC H01M002-14; H01M006-04
CC 52-2 (Electrochemical, Radiational, and Thermal Energy Technology)
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI JP 54050829	A2	19790421	JP 1977-116415	19770928
PRAI JP 1977-116415	A	19770928		

CLASS

PATENT NO.	CLASS	PATENT FAMILY CLASSIFICATION CODES
JP 54050829	IC	H01M002-14; H01M006-04
	IPCI	H01M0002-14; H01M0006-04
	IPCR	H01M0002-14 [I,A]; H01M0002-14 [I,C*]; H01M0006-04 [I,A]; H01M0006-04 [I,C*]

AB A cathode mix and an anode gel are separated by a laminated separator. The

separator consists of 2 or 3 layers of cellophane and porous **films** of **polyethylene** [9002-88-4], **polypropylene**, or Teflon. The separator eliminates the electrolyte retainer and its internal resistance is low. A **battery** using the separator is suitable for low temperature use. Thus, an alkaline **battery** was prepared with a Ag2O-grpahite cathode mix, a cellophane-**polyethylene** -cellophane composite separator, and a Zn powder-Zn amalgam-Na polyacrylate-KOH anode mix. The **battery** output dropped to 1.0 V after 97 min at -20° and 125-Ω load vs. 33 min for a **battery** with a nylon nonwoven electrolyte retainer and a conventional separator.

ST **battery** alk separator

IT Cellophane
(**multilayer separators** from **polyethylene** and, for silver oxide-zinc **batteries**)

IT **Batteries**, secondary
(separators, for silver oxide-zinc, multilayer)

IT **9002-88-4**
RL: USES (Uses)
(**multilayer separators** from cellophane and, for silver oxide-zinc **batteries**)

L30 ANSWER 23 OF 23 JAPIO (C) 2006 JPO on STN
AN 2001-122998 JAPIO
TI MICROPOROUS MEMBRANE, **BATTERY** SEPARATOR AND METHOD FOR PRODUCING THE SAME
IN CALLAHAN ROBERT W; CALL RONALD W; HARLESON KEN J; YU TA-HUA
PA CELGARD INC
PI JP 2001122998 A 20010508 Heisei
AI JP 2000-258371 (JP2000258371 Heisei) 20000829
PRAI US 1999-385933 19990830
SO PATENT ABSTRACTS OF JAPAN (CD-ROM), Unexamined Applications, Vol. 2001
IC ICM C08J009-00
ICS B29C055-04
ICA H01M002-16; H01M010-40
ICI B29K023:00, B29K105:04, B29L007:00, B29L031:34, C08L023:00
AB PROBLEM TO BE SOLVED: To provide a cleavage resistant **battery** separator which is a thin microporous shutdown separator and has sufficient strength so that the hole may not open with easiness. SOLUTION: A microporous membrane comprises at least 80 weight% of a polymer selected from the group consisting of **polypropylene**, **polyethylene** and their copolymer and has at least about 50 kgf/cm2 of lateral resistance to cleavage. The microporous membrane is prepared by processes comprising a process of extruding a **film** precursor by a tubular **film** method at a blow-up ratio of at least about 1.5, a process for annealing the above **film** precursor and a process for drawing the annealed **film** precursor to form the microporous membrane. The **multilayer** shutdown **separator** is made of the above microporous membrane.

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